The
Electrical Review

VOL. CXXIII DECEMBER 2, 1938. No. 3184

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY. Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, SEDIST, LONDON." Code, A B C. Telephone No.: Waterloo 3333 (50 lines).

The "Electrical Review" is the recognised medium of the electrical trades and has by far the largest circulation of any electrical industrial paper in Great Britain.

SUBSCRIPTION RATES, Postage free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

Classified Advertisements—Supp. 19.
Index to Advertisers—Page xiii.

Better Industrial Lighting

Improved health and production

THERE can be little doubt in the minds of those who have opportunities of visiting industrial works that examples of good lighting have appreciably multiplied of late. This is not surprising in view of the achievements of research in the production of new lamps and (almost as important) appropriate fittings and of the knowledge that has been disseminated by technical societies as to the use and measurement of illumination. Not less important is the cheapening of electricity which, in combination with those other developments, has resulted in giving nearly three times the candle-hours that could be bought for the same money ten years ago.

Nevertheless, the position as a whole hardly calls for self-congratulation. A large proportion of the satisfactory installations are in new factory buildings, which could hardly fail to be influenced by the spirit of the age as manifested in foot-candles, and by no means all of these make full use of the opportunities provided by modern equipment. Moreover, improvement is too often least where the need for it is greatest. The miserably inadequate and unsuitable lighting conditions at many factories have been shown over and over again to have ill effects on output that are out of all proportion to the slight increase in production costs incurred in securing reasonably good illumination.

Strangely Belated

That, however, is the affair of the factory owners. Where the Home Office comes in is in seeing that the safety and health of the operatives are not sacrificed to parsimony. Apart from the greatest likelihood of accidents in ill-lit areas, eyestrain has an effect on physical well-being that is none the less serious because it is not immediately apparent. Considering the elaborate precautions to safeguard workers that have long formed part of the factory code, it is strange that statutory provisions for securing so essential a need as a minimum standard of illumination in industry generally should not have been adopted before the 1937 Factory Act.

This Act envisages the introduction of regulations for prescribing a standard of sufficient and suitable lighting for factories or for any process carried out in them. Such regulations, it may be anticipated, will be based upon the recommendations of the Fourth Report of the Home Office Committee on Lighting in Factories of which a brief account was given by us last week and which is discussed by Mr. W. Robinson in this issue.

There is nothing very drastic in these recommendations which relate to general lighting and the avoidance of glare and do not at present deal with the values required on the working plane. One foot-candle as a legal minimum (natural lighting being supplemented by artificial where necessary) for floor areas in working places is an easy figure to remember. For other parts of industrial premises, the object is to provide enough light for seeing obstacles with a view to avoiding accidents, and lower values are, therefore, permissible down to about half the illumination given by the full moon. The new regulations will probably not come into force until next July in order to give time for the more backward concerns to come into line; this seems ample allowance taking into account the low minima specified.

Process Illumination

The Committee has not attempted to draw up a schedule of standards for the complex and variable range of processes requiring discrimination of detail, as it expects to be able to devise a scientific basis for estimating the illumination required for any given process from which legal minimum standards can be derived. Until such a basis is forthcoming, the tables issued by the Illuminating Engineering Society and E.L.M.A. should be followed where applicable. Next to inadequate lighting comes unsuitable lighting—mainly glare; even the simplest installation calls for skill in planning.

It is important to remember that the recommendations of the Committee prescribe merely minimum legal standards and not what ought to be regarded as sound practice, although the main body of the Report, which discusses the elements of good lighting, could be read with profit by all interested in the subject. These recommendations will not, therefore, affect those factories where more than a marginal efficiency prevails. In order to bring the latter up to a really creditable standard there will be just as much need as ever there was for educational work, such as that performed by the E.L.M.A. Lighting Service Bureau (the experimental work of which, under Mr. W. J. Jones, receives special commendation in the Report), technical societies, manufacturers, installation contractors and supply undertakings, all co-operating in an appeal to the enlightened self-interest of the industrial user.

Giving a Lead

TEAM work is as essential between undertakings as it is among the staffs of the individual undertakings, as Mr. E. A. Mills pointed out at the E.P.E.A. dinner, if we are to make the most of the breathing space given by the postponement of the Distribution Bill. Something more is needed, however. The difficulty has often been to get anyone to take the initiative in effective leadership and in co-ordinating unrelated efforts. Sir Cyril Hurcomb referred to two sorts of co-operation, the voluntary and the semi-compulsory. There seems to us to be an intermediate kind—the kind that Mr. Mills evidently had in mind when he suggested that the Commissioners could give a useful lead on less contentious matters in which improvement was clearly desirable. An example of what we mean, is the action of the Commissioners in putting in train the preliminaries towards speeding up voltage standardisation, since no one else seemed inclined to take up the job. Their intention was announced at the dinner of the I.E.E. Local Centre at Liverpool (as reported in our columns last week). Wouldn't it add to the interest of such speeches if it were customary for announcements of policy to be reserved for occasions like these wherever practicable!

High-voltage Switchgear

IT will be interesting to see how far the close attention that is being paid in the United States to the possibilities of metal-clad switchgear will take material form when the public utility companies get going with their expansion programmes after a long period of quiet. There is little doubt about its holding its premier position in Great Britain, and the examples going through the shops of Ferguson, Pailin, Ltd., are worthy of yesterday's electrical event—the silver jubilee of the company. From what can be seen at Higher Openshaw, it may be deduced that stand-by from the grid will be materially strengthened (primarily in connection with national defence) as the result of the installation of new grid sub-stations at points remote from generating stations, as at Leeds, where further heavy-duty switchgear will be needed. Although Ferguson, Pailin is part of a great combination of interests, there seems to be abundant support for the claim made by Mr. S. Ferguson that his company has sacrificed none of its powers of initiative or the human qualities that are sometimes supposed to be more prevalent in small concerns, and that it manages to combine the virtues of competition with the advantages due to a pooling of technical experience.

Aid for Shopkeepers

EFFICIENT shop-window lighting is as important a sales aid to the shopkeeper as the various display material which forms an inevitable part of his window-dressing, and there must be many small shopkeepers who look with envy upon the effective window-lighting systems of the larger stores, which, although desirable, are beyond the means of the "small" man owing to their initial cost. E.D.A. and E.L.M.A. have done a good deal to help in this direction, but a lot has to be left to the local supply authority. It is interesting to note, therefore, that Mr. W. C. Parker, borough electrical engineer of Fulham, has prepared a scheme for assisting shopkeepers to install modern systems of lighting. It is proposed that one of the Fulham sales service engineers should be appointed to prepare designs after receiving a special course of training from E.L.M.A., and these designs will be installed under a hire-purchase agreement. In addition to ensuring that shopkeepers will have installations appropriate to the goods they have to display, the scheme should add to the prosperity of both the electricity undertaking and the local tradesmen.

Fair Trading

THE code of commercial morality embodied in the Electrical Fair Trading Policy is making headway in the industry as rapidly as any voluntary measure of this sort can be hoped to do. The past year's activities have included the regularisation of the decorator, decorative specialist and garage whose businesses involve the supply of electrical equipment. Efforts are being made to prevent supplies reaching those dealers who make a practice of selling goods to the public at less than the recognised list prices—a practice which is not only suicidal (which, perhaps, doesn't matter much) but injurious to traders who are decent enough to observe the rules. Another matter which the Fair Trading Council is up against is the granting of trade terms by certain general wholesalers to their customers irrespective of their class of business. We commend the Policy to the attention of all who have the interests of the industry (and, in the long run, the public) at heart.

Crompton Parkinson

A COMPANY is in an enviable position when it can report that its liquid cash resources are ample for its needs and therefore it can disburse more in the way of dividends. Mr. Frank Parkinson shows this to be the case with Crompton Parkinson, Ltd., in the speech which he has prepared for the Company's meeting on December 16. It is hoped that the increased dividend on the "A" ordinary shares (15 per cent.) will be maintained and that it will be supplemented by a cash bonus. The "A" ordinary capital is again to be increased to enable bonus shares to be issued. Mr. Parkinson regards the future of the company with "quiet confidence," and mentions its efforts to expand its overseas trade.

The Industry's Associations

FOR a long time past it has been apparent to us that the right hand of the industry does not always know what the left hand is doing. In other words, many people are so immersed in their own immediate activities that they are not familiar with the work of other branches. To help to remedy this state of affairs we propose to publish a series of articles dealing with the principal electrical associations in which their origin and history will be briefly reviewed and some indication of their aims and achievements will be given. We commence the series in this issue with an article on the British Electrical Development Association with whose activities the whole of the industry is concerned, although in its present constitution it is an electricity supply authorities' organisation.

Electricity Prices

AT a dinner in honour of Mr. P. D. Tuckett's forty years as a director of the "City" Company, Ald. Sir George Wilkinson wished that the company would follow the example of the G.P.O., which had reduced the price of telegrams to nine words for 6d.; he thought that it might supply nine lighting units at the same price. On the other hand, the company would, no doubt, like to get the same price for its electricity as the Post Office does—many pence for a few watt-minutes.

IN THIS ISSUE

Articles:	*Page*
History and Activities of E.D.A.	*783*
Factory Air-raid Precautions	*785*
Power Switchgear Production	*787*
E.P.E.A. Dinner	*788*
Factory Lighting	*789*
News:	
Italian Electrical Projects	*786*
Poplar Town Hall	*791*
Conditions in Canada	*799*
Fair Trading Policy	*805*
Chilean Imports	*807*

Organisations of the Industry—I

The British Electrical Development Association

By A. C. Cramb, M.I.E.E., M.I.Mech.E., Director and Secretary

Although E.D.A. is now financed mainly by the electricity supply undertakings its activities are of vital interest to the whole of the electrical industry. This article contains a brief history of the Association and an account of its work.

TWENTY years ago the electrical industry was small and unco-ordinated. Manufacturers were still addicted to the steam engine for power, there was an almost infinite variety of voltages, and DC was as prevalent as A.C. In the homes of the people even electric lighting was regarded as a relatively expensive improvement on gas. Electricity was considered to be something of a luxury.

But there were at the head of this young and struggling industry men who believed that they had in in their power to inspire a greater industrial revolution than any this country had seen before. An Electrical Development Association had been the subject of discussion for a long time, and it is recorded that before the War the municipal electrical engineers in Greater London took steps to promote such an enterprise on a co-operative basis. This was extended later to include the company undertakings in London, with the late Sir Harry Renwick as chairman of the enlarged body, while I was appointed vice-chairman, but the outbreak of war postponed developments.

Brig.-Gen. R. F. Legge, D.S.O., Chairman of the E.D.A. Council [*Studio Briggs*

After the war the importance of development work became increasingly evident, and the Institution of Electrical Engineers formed a committee for dealing with certain applications of electricity. Out of this grew the suggestion that a joint Electrical Development Association should be set up. It was a splendid ideal, and supply undertakings, manufacturers, wholesalers and contractors agreed to make annual contributions. A staff was appointed, consisting of Mr. J. W. Beauchamp, M.I.E.E., as director and secretary, with Mr. V. W. Dale as his assistant. They came from West Ham, where Mr. Beauchamp was the engineer and manager of the Corporation Electricity Department. With the addition of two office assistants, the staff of E.D.A. was complete, and on the morning of May 23rd, 1919, the two principals unlocked the door of the suite of five rooms which had been taken at 88, Kingsway.

Two urgent tasks faced these two pioneers. The office had to be furnished as cheaply as possible—and an immediate supply of propaganda had to be prepared to meet the demands of members. Stealthily, through the back streets of London, the Director and his assistant walked in search of second-hand furniture shops; and piece by piece desks, chairs and filing cabinets were secured at bargain prices. Mr. Dale, now the Business Manager of the Association, treasures in his office to-day one of these original heirlooms—a bookcase which is reputed to have cost the proverbial "song." Mr. Dale and his bookcase have seen E.D.A. through its history to date.

For three whole months Messrs. Beauchamp and Dale concentrated on the writing and publication of propaganda material; and although some of these early pamphlets are obviously dated, the other day an undertaking sent an inquiry for 300,000 copies of one of Mr. Dale's earliest efforts—No. 30/3, "Little Electric Servants."

The activities of E.D.A. rapidly expanded. It soon became a real force in the electrical industry. In the early days, subscriptions may have been paid with some reluctance, but under Mr. Beauchamp's energetic leadership, reluctance changed to enthusiasm, and within a few years subscription revenue had been quadrupled. One of the high lights of Mr. Beauchamp's period of office, it is generally agreed, was the magnificent electrical exhibit which E.D.A. organised at the British Empire Exhibition at Wembley, in 1924.

When E.D.A.'s first Director returned in 1928 to active participation in the business of electricity supply he was succeeded by Lt.-Col. W. A. Vignoles, D.S.O., chief engineer of the Grimsby undertaking, who was responsible for carrying out the decentralisation of E.D.A.'s organisation; the area committees which had actually been inaugurated under Mr. Beauchamp's direction were extended to cover all provincial areas. After three years as Director, Lt.-Col. Vignoles retired to take up the post of joint managing director of Messrs. Evershed & Vignoles, Ltd., and I was appointed to succeed him.

From the beginning E.D.A.'s task was to be the spearhead of progress, to advertise electricity with all the modern methods of propaganda—poster and press advertising, lectures, pamphlets and exhibitions; in short, to create such a demand that the industry would have an ever-expanding market for its own progressive developments.

How far has E.D.A. succeeded in its task? The fruits of publicity and propaganda can seldom, if ever, be measured, but the electrical industry to-day employs directly and indirectly over one million workers. Nearly eight million homes are connected to the mains of supply authorities and modern industry depends on the efficient and economic supply of electricity for power, light and heat. At the time of the inception of E.D.A. a domestic electric cooker was a curiosity; now over a million British housewives cook by electricity.

It is perhaps a little difficult for us to-day, surrounded as we are by all the evidence of the benefits that electricity is able to bring to hearth and home, to commerce, industry and recreation, to realise that such progress has been made only in post-war years. While obviously it would be an extravagance to suggest that the impressive advances of electricity over this period have been promoted entirely by any single

The Business Manager, Director and Secretary, and Chief Technical Assistant of E.D.A.: Messrs. V. W. Dale, A. C. Cramb, M.I.E.E., M.I.Mech.E., and J. I. Bernard, B.Sc.Tech., A.M.I.E.E.

organisation, it is a significant fact that these advances have coincided with the period of E.D.A.'s existence.

In the nineteen years since E.D.A. was established the number of domestic consumers has been quadrupled—from under two million to nearly eight million homes. Domestic consumption has been multiplied ten times—from 600 million units to 6,000 million kWh per annum. The total consumption of electricity for all purposes has been multiplied eight times—from 3,000 million kWh to over 23,000 million kWh. At the same time the price of electricity has been drastically reduced, making it more easily available to domestic and industrial consumers generally.

By 1933 the results achieved and the possibilities in view made it desirable to reorganise the basis of working and the supply side of the electrical industry including the Central Electricity Board, which makes a substantial contribution to the funds each year, assumed the sole responsibility for the organising and financing of the Association. To-day E.D.A. represents the large majority of supply undertakings in this country. Its membership stands at 428, spread over the whole of these islands, and, in addition, there is a large overseas membership embracing undertakings through the Empire. The work of headquarters directed from 2, Savoy Hill is supplemented by area organisations throughout England, Scotland, and Northern Ireland; each area is under the care of an E.D.A. staff officer.

Mr. F. Wighton, Press Officer

The headquarters organisation includes specialists in various branches whose high degree of technical knowledge is supplemented by experience of modern propaganda methods. The principal departments include advertising, technical development and editorial publicity. On the advertising side national newspaper campaigns are planned and carried through over the greater part of each year, the national "coverage" being supplemented by specialised advertising in periodicals and trade journals each with its appeal to a particular class of reader. The Advertising Department operates in close co-operation with the undertakings in the preparation of local advertisements.

The Association is now one of the largest organisers of exhibitions in the world and those organised from 2, Savoy Hill—ranging from electrical displays in such national events as the Ideal Home Exhibition and the Woman's Fair to local exhibitions in all parts of the country—are visited by audiences numbering several millions each year. Electrical displays for all events of national and local importance are organised down to the last detail of stand design, press publicity, and so on.

Electrical methods are also demonstrated by E.D.A. at agricultural shows throughout the country. For most important events a special electrical stand is designed and at the Royal Agricultural Show and on other national occasions ambitious exhibits—such as the electric farm at the recent Royal Show at Cardiff—are staged.

Technical Advice and Lectures

The technical staff of the Association under the direction of Mr. J. I. Bernard, B.Sc.(Tech.), A.M.I.E.E., Chief Technical Assistant, is equipped to cope with practically every phase of development, including street lighting, domestic and industrial power, electric transport and large-scale commercial electrification. These experts' function is to provide an advisory service to members and to consumers or potential consumers interested in the installation of new electrical plant. This department also contributes considerably to the ultimate good of the industry by its services on committees dealing with such questions as standardisation of equipment.

A lecture service, which provides hundreds of lectures during the course of the year under the ægis of public and social bodies, is also supplied by the Association. Courses for demonstrators designed to promote a higher standard of sales' efficiency have achieved a signal success. The Salesmanship Training Course launched a year or so ago is producing for the industry salesmen and saleswomen of which it can be proud.

The organisation of E.D.A. possesses an elasticity that ensures its ability to expand as the needs of the industry dictate. It can be said that there is practically no phase of domestic or industrial development which is not embraced in the scope of the Association's work.

A considerable amount of valuable indirect propaganda is pursued in collaboration with ancillary industries and with organisations devoted to particular aspects of the public good. Through the Building Centre, for example, the interests of the architect and builder are engaged and there is evidence of the success of the Association's endeavour to promote more efficient and more æsthetic standards of design and construction. This linking up of mutual interests has an almost limitless scope.

Propaganda by means of films is another activity to which E.D.A. is devoting close attention. The value of this form of publicity was proved by the E.D.A. film campaign three years ago and it is thought that it might be pursued through the setting up of a film library from which undertakings could obtain suitable material for cinema shows organised by themselves. The first three films for such a library have been completed and additional ones will be added yearly.

Some of the most successful propaganda for electricity is carried out by E.D.A. in co-operation with manufacturers in the promotion of seasonal campaigns. Outstanding successes have been achieved by the Domestic Refrigeration Campaign and the "Better Light—Better Sight" Campaign and experience suggests that there is practically no phase in the development of electricity that will not lend itself to co-operative national campaigning in the future.

The advance of the electrical industry in the past twenty years has been spectacular in the extreme. But far from any finality having been reached the electrification of Britain has really only begun. It is the aim of E.D.A. and all of those involved in its organisation to continue the crusade to its logical conclusion. It has the energy, the enterprise and the courage to do so.

The La Mont Boiler

Tests at Glasgow

IN the ELECTRICAL REVIEW of September 30th the La Mont Boiler installed at the works of G. & J. Weir, Ltd., at Cathcart by John Thompson Water Tube Boilers, Ltd., was described. The results of a subsequent regular test at full normal load are given below. While no difficulty is experienced in obtaining the full 1,000 lb. per sq. in. from the boiler, the tests were conducted at a working pressure of a little over 900 lb., as at present the boiler is operating on an extremely variable load. Under these conditions when there is too little a margin below blow-off pressure the safety valves are apt to lift frequently and require repeated refacing. Since the turbine is designed to operate at 850 lb. per sq. in., a pressure of a little above this is quite sufficient for normal operations. The high overall efficiency of 86.46 per cent. is achieved with considerable saving in space. The following are abridged results :—

Evaporation, lb. per hr., normal rating	40,748
Steam pressure, lb. per sq. in.	907.3
Steam temperature, deg. F.	877.2
Boiler exit-gas temperature, deg. F.	766.6
Economiser gas-outlet temperature, deg. F.	295.6
CO_2 per cent., economiser outlet	15.057
Gross calorific value of fuel as fired, B.Th.U. per lb.	10,865
Moisture per cent.	16.77

	per cent.
Overall efficiency of boiler plant	86.46
Heat lost in dry flue gases	4.82
Heat lost by moisture in flue gases	5.50
Heat lost due to incomplete combustion	0.39
Heat lost due to combustible in ash	0.736
Unaccounted for and radiation losses	2.094
	100.000

	per cent.
Power absorbed by auxiliaries	1.25
Net overall efficiency on gross calorific value	85.21
Power absorbed by circulating pumps	0.55
Guaranteed overall efficiency	81.0
Guaranteed efficiency exceeded by	5.46

The heat release in combustion chamber was 39,760 B.Th.U. per cu. ft. per hr.

This high efficiency was achieved with considerable saving in space.

Telephone Repeater Stations

AN address on telephone repeater stations was given in the Royal Technical College, Glasgow, on November 24th by Mr. H. C. Stevenson to members of the Scottish Students' Section of the Institution of Electrical Engineers. The importance of repeaters, he said, grew with the increase in the underground communication network. After outlining the development of commercial repeater stations and mentioning special aspects which affected the power engineer, Mr. Stevenson said that the telephone station had many analogies with a wireless receiver, but whereas the latter contained only one amplifier the former might contain as many as 1,000. In Scotland eighteen repeater stations were already working on the trunk routes, and another nineteen were in course of erection or were projected.

Factory Air Raid Precautions

By T. E. Wallis, (Safety Officer, M.E.M. Co., Ltd.)

Details of a practical scheme which has been adopted for a medium-sized works in the Midlands

FOR some considerable time the Midland Electric Manufacturing Co., of Birmingham, has been interested in the protection of its plant and employés, in the event of attack by hostile aircraft, and in April of this year I was sent to the Home Office Civilian Anti-gas School, at the Hawkhills, Easingwold, Yorks, for a course. As a result of the information obtained during this course, the company has now completed plans for the evacuation and protection of its workers, and the safeguarding of buildings and plant. A brief outline of the arrangements is here given in the hope that it will be of interest to other employers.

The plans are based on a factory with a total of about 1,000 employés. The organisation consists of various working parties, whose duties are carefully defined and laid down. These sub-divisions are as under :—

Central Control: Responsible for the receiving of information and orders from the local authorities' A.R.P. headquarters, and the issuing of instructions to the various branches of the works organisation.

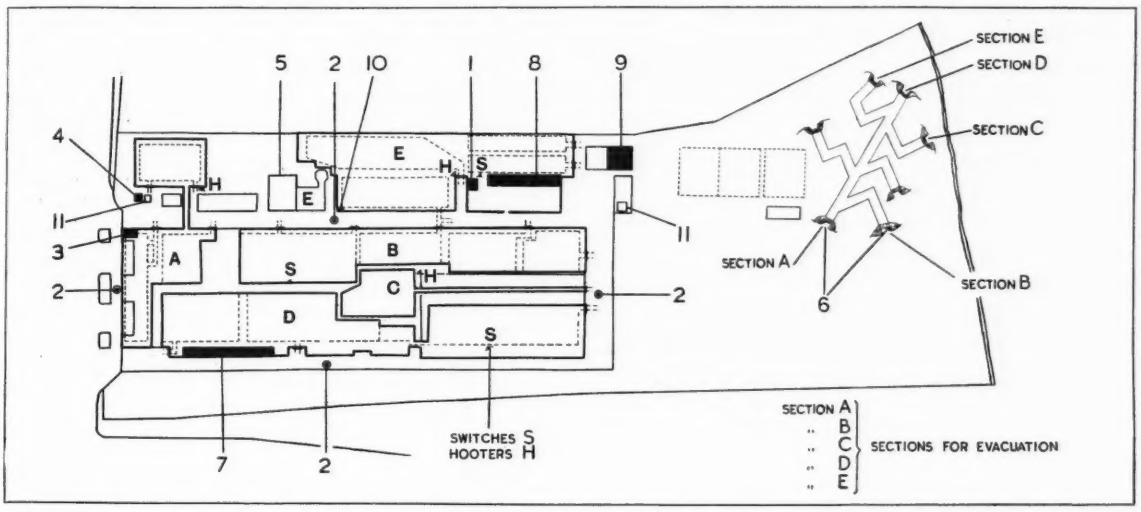
Area Control (four posts situated in look-outs on each side of the works) : The duties of these officials will be to keep in touch with Central Control, advising them of the progress of evacuation in the event of a raid, and afterwards reporting immediately any damage caused by attacking aircraft, notifying the presence of gas, and informing Central Control of any emergency measures necessary.

Supply Control: After giving the air raid warning on the works communication system, this group will be responsible for cutting off all electric power, gas, &c. They will then remain on duty, being responsible for the emergency lighting system in the event of failure of the Corporation mains, and be available to take any steps to isolate electric, gas and water mains that may be damaged.

Fire Squads: These workers will act on orders from Central Control, and will take any necessary steps to prevent the spread of fire and minimise damage caused by incendiary bombs, with fire-fighting equipment which has been suitably placed in every department. Various underground tanks of large capacity will be used for storing adequate supplies of water to be used in the event of failure of the city supply.

Wreckage and Maintenance Squads: These squads, provided with complete portable equipment, will await orders from Central Control, and will clear away débris, reinforce or demolish buildings which may have been rendered unsafe, &c.

Rescue Squads: These people will work in conjunction with the wreckage and maintenance squads, their duties being to convey any of the employés who may have suffered injury to the first-aid post for treatment or conveyance to hospital.



1, Central control. 2, Area control. 3, Supply control. 4, Fire squads. 5, Wreckage and maintenance. 6, Shelters. 7, First-aid post. 8, Cleaning dutymen. 9, Decontamination. 10, Works syren. 11, Reserve water supply.

Taking Cover: Various officials and leaders have been allocated the duties of arranging and supervising the evacuation of all employés, excepting members of the working parties, to the shelters provided, and to maintain an orderly and friendly spirit during the emergency.

First-Aid and Cleansing Posts: *Section A—Cleansing of Duty Men* : This section will be engaged in the issuing of protective clothing, and the dressing and undressing of working parties when going on and coming off duty. *Section B—Cleansing and Treatment of the Injured* : This branch will be responsible for the cleansing and treatment of casualties. As many as possible, according to their injuries and gas contamination, will be treated on the premises, the more serious cases being sent without delay to the base hospitals.

A decontamination squad at practice

Decontamination Squads: On receipt of instructions from Central Control, this unit will proceed to any area requiring to be decontaminated, using methods suitable for the type of contamination which has been reported by Area Control.

Reference to the plan reproduced herewith will show the posts allocated to the various squads and their positions about the works. All these posts have been selected because of their invulnerability to blast and splinter effects from high-explosive bombs, and certain structural strengthening has been arranged.

The method of protection adopted for the employés is covered shelters on vacant ground adjacent to the works. These have

been excavated to a depth of 7 ft., soundly timbered, and covered with corrugated iron, earth and shingle to a depth of 3 ft. which, together with airlocks at each entrance and traverse, make the shelters gasproof. The trenches are constructed on falling ground, rendering any special drainage unnecessary. Emergency electric lighting is available. Provision is made for seating those taking shelter in order to avoid undue fatigue, and facilities for first aid for those requiring treatment will be available in the shelters.

Arrangements for evacuating the works can probably be best understood if a raid by hostile aircraft is imagined. Immediately the air raid alarm is picked up, the prescribed signal will be transmitted throughout the works. The Section Leaders who have been appointed will immediately leave their work, and followed by the employés in that section, proceed to their allotted shelter entrance. Each person will carry his outdoor clothing and civilian respirator, which in a state of emergency will be kept near his working position.

Part of the trenches, showing seating accommodation and air-lock

The Evacuation Official in charge of that section will then make a detailed examination to ensure that every employé has left the works, reporting on arrival at the shelters to the appropriate official that his part of the evacuation is complete. Any person whose work demands his moving about the works, will before leaving the section make arrangements for his clothing and respirator to be taken to the shelters, and on the alarm sounding, join the nearest party to him at the time and not endeavour to make his way to his own section. After the Trench Official is satisfied that the whole of the evacuation is completed, and his numbers are correct, he will inform Central Control of this by runner, and close all the air-locks.

For the purpose of this evacuation, the works have been divided into five sections lettered, A, B, C, D and E, as shown in the plan, it will be seen that those employés whose working places are at a distance from the shelters have been allocated to the nearest entrance. Definite routes have been laid down, so that there will be no confusion or crossing of tracks. The scheme has been based on the assumption that no more than seven minutes' warning would be given of an air raid, and by a trial evacuation it has been found that the whole of the employés can be in position and the shelters closed in approximately five minutes.

Training Volunteers

So far as the training of employés is concerned, the key officials in the scheme were first given a short course to enable a Works A.R.P. Committee to be formed. Following this, requests were made for volunteers, and these were divided into outdoor and indoor workers, the former receiving the full modified course, and the latter the voluntary aid course. After the training had been completed, the whole of the personnel were allocated to the various working parties, and are now receiving monthly refresher instruction in the duties applicable to their own sections. All instruction has been given and all practices, drills, etc., are performed voluntarily outside normal working hours.

The method of transmitting warning of an air raid is by means of special hooters situated at points in the works where they are audible in all parts; they have been connected to the works siren which in the event of hostilities will be part of the city's warning system. This will ensure that the regulation signals are transmitted without delay throughout the whole works.

The company's surgery will be utilised for the cleansing and treatment of the injured, whilst the foundry shower baths and dressing rooms will be used for the cleansing of the members of the various working parties. A full complement of protective clothing and respirators will be provided immediately the need arises.

First aid classes for the members of the works have been held during the last 12 months, and approximately 40 employés holding certificates and vouchers of the St. John Ambulance Brigade Association, will be available for first aid work.

The foregoing arrangements are, of course, made in anticipation of air raids during working hours. Special arrangements for maintenance men and cleaners who are occupied in the factory during the night have been made, and certain individuals have been fully instructed regarding the extinguishing of lights, the sounding of alarms, and taking cover.

At the request of the management, a series of lectures and demonstrations has been given to about 75 per cent. of the employés on the functions of the civilian respirator, its care, fitting and storing, together with a full description of the types of gases likely to be used by an enemy. The selection and construction of refuge rooms in the employés own households was exhaustively explained. Opportunity was taken to impress upon the employés the advisability of their taking advantage of the shelter provided for them at the works, stressing that there would be insufficient time to get to their homes and that if they attempted to do this they would jeopardise the arrangements made by the A.R.P. authorities.

An interesting feature of the arrangements is that the same evacuation plans would be brought into operation in the event of a serious fire necessitating the withdrawal of employés from their working positions. In such an event they would not take cover in the trenches, but would assemble at specified points on the sports field, clear of the danger zone.

An A.R.P. demonstration is being arranged in the near future to enable the employés to see the steps which have been taken for their protection, and accommodation will be available for a limited number of visitors. Executives of factories who would like an opportunity of seeing the demonstration are invited to make application to the M.E.M. Company.

Italian Electrical Projects

From a Correspondent in North Italy

RECENT developments in Italy have included the construction of new hydro-electric and steam plants. On September 1st last there were under construction or under consideration seventy-six plants having a total capacity of 717,000 HP and a yearly output of 3,247 million kWh as against fifty-one plants aggregating 304,000 HP and an output of 1,373 million kWh at September 1st, 1937. It is estimated that by 1940 the total output will reach 20,500 million kWh yearly. Although the cost of new construction is higher than that of existing plants a lower cost of operation should compensate for this owing to co-ordination of hydro-electric plants with different hydrological characteristics, and the creation of a high-voltage system from he Alps to the end of the Italian peninsula.

In the Valtournanche, on the Marmore River, the output will be raised from 160 million to 270 million kWh yearly, while in the Toce valley the increase will be from 451 million to 1,532 million kWh. In addition to the Isonzo works hydro-electric stations are being constructed underground on the Isarco River and in Central Italy. At a plant which has just been completed at Lardarello electricity is generated by means of steam obtained from twenty-two boilers heated with the natural heat from the borax mines; this plant is to supply electricity for operating the Viareggio-Rome railway which was to be inaugurated last month.

The programme includes further increases of output by existing hydro-electric plants in Northern Italy of 3,600 million kWh for the Società Idroelettrica Piemonte of Turin, the Edison, Adriatica and other concerns, and 500 million kWh for the municipal electricity undertakings at Turin, Milan and Brescia.

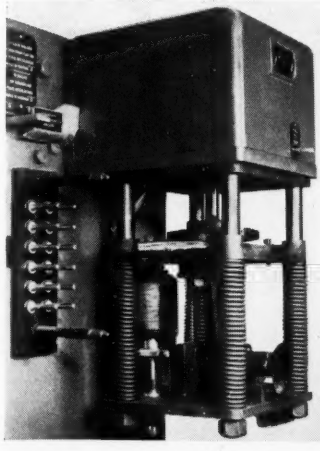
Increased outputs are anticipated in Central Italy (Terni and Rome undertakings) of 1,900 million kWh, in Southern Italy (Meridionale di Elettricità) 500 million kWh, in Sicily 100 million kWh, and in Sardinia 100 million kWh. The programmes for Sardinia include the construction of new steam stations having an eventual output of 200 million kWh, using coal from the Bacu Abis mines.

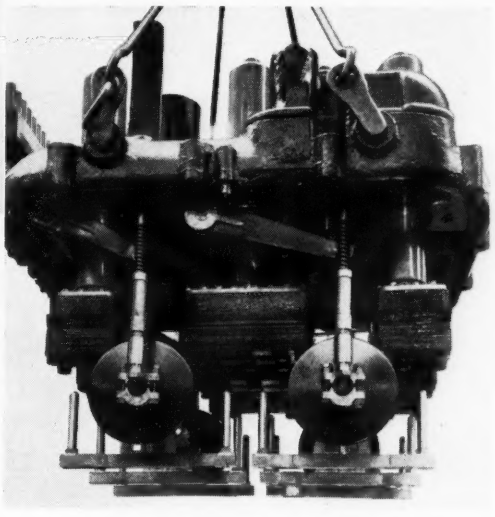
On completion of the electrification of the Milano-Ancona, and of the Viareggio-Rome railways, the question of electrifying the Cervignano-Venice-Bologna and the Ancona-Lecce railways, and of the whole line from Bologna to Verona and Trento will be considered; these are expected to require 2,000 million kWh yearly at least. Electrification of the Naples-Reggio-Calabria line has reduced the time of the trip from Rome to Reggio Calabria to 10 hr. and 30 min. from 15 hr. and 30 min. taken in 1930. When new railcars designed to do 150 km per hr. are in service a further reduction to a little more than 8 hr. is hoped for. During 1936-1937 electric traction has handled 45 per cent. of the whole traffic. Between 1934 and 1937 the average weight hauled by the steam trains increased from 260 to 293 tons, and by electric trains from 296 to 359 tons; the importance of this is that whereas traffic grows the capacity of the lines is limited by geographical considerations.

Power Switchgear Production

Silver Jubilee of Ferguson, Pailin Ltd.

PERHAPS the most striking way in which we can illustrate the progress of Ferguson, Pailin, Ltd., from its modest beginnings twenty-five years ago to its present position as one of the leading firms of British switchgear manufacturers, is by a reference to the growth in the number of men employed. On December 1st, 1913, the staff consisted of two men; to-day it numbers 2,600. So far from there being any tendency to saturation in development as indicated in this way, the total of those employed has actually risen by over a thousand during the past five years. The present factory in Higher Openshaw, Manchester, now occupies a ground space of 40,000 sq. yd. on a site of 61,000 sq. yd. The original capital was £1,000; to-day the assets are valued at well over £1,000,000.

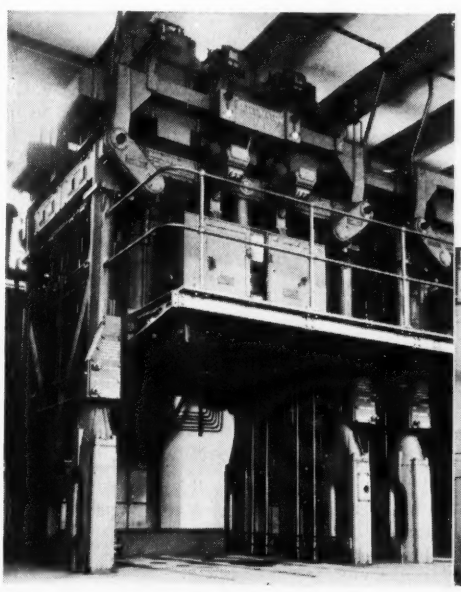




Above: Spring reclosing mechanism. Right: Switchgear in course of reconstruction

One of the first manufacturers to appreciate the merits of the metal-clad switchgear, Ferguson, Pailin decided to develop the round-tank design. The company also claims credit for introducing the principle of vertical isolation. As long ago as 1919 it carried out rupturing capacity tests and on a more ambitious scale in the United States in 1927. More recently, in conjunction with the B.T.H. and Met.-Vick. concerns, it has built the plant operated by the Switchgear Testing Co. for testing switches as complete units.

On the occasion of a recent visit we found the works well occupied with partly completed orders. Among the largest of these are a cellular switchboard with Durasteel compartments for St. Marylebone, 132-kV and 33-kV units for the Central Electricity Board, and an extension for Kirkstall power station (Leeds). The last named is rated at 1,500,000 kVA for 11 kV, and has two independent circuit-breakers for each set of bus-bars with phase segregation. A number of contracts are also in hand for India and the Dominions.



Prominent among the smaller metal-clad distribution switchgear is a 250,000-kVA design, said to be the smallest in overall physical dimensions of its class in the world. Some of these, such as those being made for the Bunnerong power station at Sydney, are for 3.3 kV and, as at this voltage the thermal and electromagnetic stresses are four times those experienced at 6.6 kV, any saving in insulation would appear to be more than offset by the need for a more robust mechanical construction. Other 3.3-kV breakers, rated at 150,000 kVA, are on order for the auxiliaries of the extended Battersea station of the London Power Co.

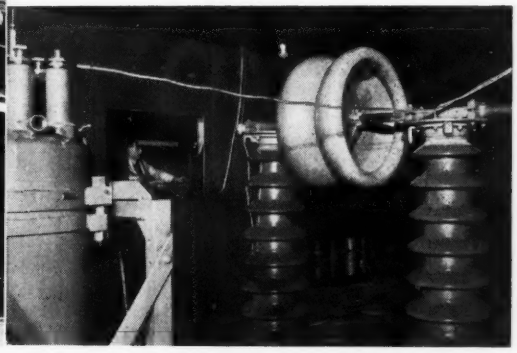
In various stages of manufacturing progress were numerous examples of the three principal types of switch made by Ferguson, Pailin for 22 and 33 kV systems with ratings up to 750,000 kVA—all incorporating built-in motors for raising and lowering the circuit-breakers, which are completely segregated from other portions of the units by steel screens. Opportunities were afforded us of examining the details of off-load selection for duplicate bus-bar installations by means of breaker transfer and for on-load selection by including two breakers with independent operating mechanisms in one tank. The object of this design is to avoid the use of knife selectors or plugs and to secure flexibility in switching.

In view of the growing realisation of the inadvisability of hand-closing breakers rated at more than 150,000 kVA or against a short-circuit current exceeding 10,000 A, the spring mechanism developed is of considerable interest. The springs are compressed by hand through a mechanical reduction device and are held by a catch, which can be released by hand locally or by means of a lanyard or else electrically. Another aspect of the growth of short-circuit values is to be seen in the older circuit-breakers that have been called in for reconditioning. In many cases the rupturing capacity of these has been raised to a higher test and guaranteed value by rebuilding the contacts with cross-jet explosion pots and, occasionally, reinforcing the operating mechanism.

Work of this nature involves the use of the most modern machine tools using tungsten or cemented carbide for cutting. High-speed horizontal and vertical boring machines are required to deal with welded-steel parts, extensive fabrication being an outstanding feature of the company's products. Another notable example is the battery of radial-arm drilling machines with electric high-speed centralised control. Adjoining the machine shop is a tool room, impressive for the high precision with which jigs and special appliances are made. Equipment for testing up to 500 kV is available in the high-voltage laboratory, where power-factor tests on insulating materials are made with a 3-kV to 132-kV electrostatically-shielded Schering bridge designed by Ferguson, Pailin. We are informed that changes in power factor as small as from 0.01 to 0.01001 can be detected.

Nearly 10,000 instrument transformers have been built this year, each of which has been tested by a Silsby direct-reading bridge capable of measuring errors with an accuracy of one part in a thousand. Where extreme precision in metering is required, the instruments are tested in

Left: A view of the 1,500 MVA, 11-kV equipment being built for the Kirkstall power station, Leeds. Below: Insulation testing equipment



The E.P.E.A. Dinner

Visitors' tributes

IN spite of the last-minute postponement, due to the national crisis, of the dinner given by the Southern Division of the Electrical Power Engineers' Association to the members of the National Executive Council, the number of those over whom Mr. W. H. Wells (chairman, Southern Division) presided at the Holborn Restaurant on Friday last seemed as large as ever. Actually at 550 it was 25 less than the high-water mark of last year, but many applications for tickets after the final arrangements had been made had to be turned down.

The toast of "The Association" was proposed by Mr. C. D. Taite (chief engineer and manager, Lancashire Electric Power Co.), who started by expressing the thought in the minds of all present—that it was good to see the general secretary, Mr. W. A. Jones, apparently restored to full health after his illness. As a member of a Joint Board for twenty years, Mr. Taite said that he had good reason to respect Mr. Jones's character and abilities.

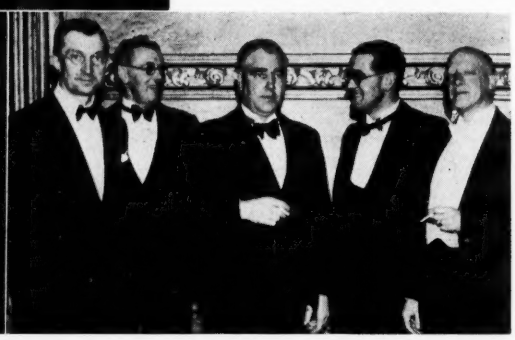
He harked back to the early days of the Association with its justifiable claims for better conditions of service and the negotiation of the salaries schedule, which had benefited the whole of the industry, since manufacturers of electrical plant —and indeed the whole of engineering—had had to follow suit. The National Joint Board had the highest regard for the able manner in which the officials of the Association presented their case and their success in looking after the interests of the members was exemplified not only in the arbitration awards totalling some £74,000 which had been made in compensation cases, but also in the E.P.E.A. scheme for technical education. Finally he eulogised the splendid way in which Mr. L. Hoskison, the president of the Association, carried out his professional duties as a member of the Lancashire Power Co.'s staff.

Responding, Mr. Hoskison stated that employers on the Joint Boards had merited the respect of the Association, the members of which desired to give full measure in return. They were concerned not only with salaries but also with doing their share towards the welfare of the electrical industry. He referred to the benevolent fund of the Association and also to the hard work put in by the honorary and permanent officials.

In proposing "The Electricity Supply Industry," Mr. E. A. Mills (borough electrical engineer, Hackney) said that as there was no change of legislation being introduced for another year, use should be made of the opportunity for voluntary co-operation.

There had been some activity in this way in the Greater London area in which all but a very few undertakings had taken part. The advertisements on the London Passenger Transport Board's vehicles provided an example of this. A large measure of unanimity had also been reached with regard to tariffs for charging batteries for electric vehicles. Mr. Mills paid a special tribute to the work of Mr. W. H. Wells as a member of his staff by suggesting that the Southern Division in electing him as chairman set as high a value on his efficiency as he (Mr. Mills) did.

Sir Cyril Hurcomb (chairman, Electricity Commission), responded. He expressed the opinion that the Association looked after the needs of its members—the men who really ran the show—in legitimate fashion. The Commissioners desired to co-operate fully with any steps taken by the industry to move forward. (We refer to the last two speeches in the leader columns of this issue.)



[Elec. Rev. photos.

1. Messrs. G. W. Essex (assistant general secretary), L. Hoskison (president) and W. A. Jones (general secretary). 2. Messrs. P. L. Weir, M. Cline, R. G. Hanna, J. F. Wallace, J. D. Watson, R. H. Toynbee and P. S. Jolin. 3. Messrs. G. Greig, T. H. Price, T. C. Hunter, R. B. Carr and J. C. Welburn

The next item on the agenda was the presentation to Mr. H. J. Cox, the immediate past-president, of a radiogram and fishing rod, to Mrs. Cox of an armchair, and to Miss Cox of a portable radio set. This ceremony was undertaken by Mr. P. S. Jolin (senior vice-president) and was followed by another in which the president asked Mr. W. G. Sutton, who had been trustee of the E.P.E.A. from 1913 to 1937, to accept a grandfather clock. The chairman expressed the thanks of everyone to Mr. F. H. Smethurst (hon. secretary Southern Division) for his successful organisation of yet another enjoyable function.

The membership of the Association is now over 6,100 out of some 7,000 technical men on the staffs of electricity supply undertakings and steadily increases in number. That the annual dinner attracts members from all parts of the country was shown in the dance that wound up the evening, when those whose pronunciation of the shibboleth "gradely" was most correct generally failed to do justice to the monosyllable that ends the "Lambeth Walk."

Power Switchgear Production (*Continued from preceding page*)

a special laboratory in which the 50-cycle supply, derived from a heavy-current power transformer, is fed through concentric bus-bars in order to eliminate electromagnetic interference with the bridge, which gives a direct reading of the ratio and phase-angle errors that are detected by a vibratory galvanometer.

In order to economise space in storage, drawings are photographed in duplicate; about 15,000 film negatives can be filed in a four-drawer quarto cabinet. A school has been formed where all apprentices are given a preliminary individual training in theory and practice before entering the factory. The period is usually thirteen weeks and includes regular lectures and instruction in safety principles. The interests of the younger employés are, however, not confined to the direct study of their craft. This is shown by the facilities provided for recreation, especially in the running of three football elevens which have achieved considerable success in amateur league matches. There are also a contributory staff pension scheme, a savings club and also a sick and benevolent fund which is supported by the company.

Lighting in Factories. By W. Robinson, B.Sc.(Tech.)

An appreciation of the Fourth Report of the Departmental Committee

THE Fourth Report of the Departmental Committee has at last arrived to fill the gap introduced by Section 5 (1) of the new Factories Act calling for "sufficient and suitable lighting" in all factory premises, and we are now informed what this is to mean from the legislative point of view. One's first reaction on reading through the Report is that it is neatly worded and well turned out; the second reaction is that it is a comparatively human document; and the third that it steers an admirably straight course between the Scylla of the industrial user and the Charybdis of the lighting fanatic. Looking at it critically, it is a document that merits general approbation, and there will be a general feeling that the Committee has shown courage and commonsense in its recommendations while imposing no great burden on factory managements.

Outstanding features of the Report are the stress placed on *quality* of illumination; the good advice given therein; and the provision made for further investigation with a view to augmenting the proposals.

Of particular interest is the indication of the close liaison that has been maintained throughout with the electrical trade, manufacturers, and lighting bodies, as is shown in the first section of the Report. The investigations included visits to forty-three representative factories in London and the provinces; demonstrations arranged by such bodies as the E.L.M.A. Lighting Service Bureau, and the hearing of technical evidence submitted among others by the Electric Lamp Manufacturers' Association, with the collaboration of the British Electrical Development Association, the British Electrical and Allied Manufacturers' Association, the Electric Light Fittings Association, and the Electrical Contractors' Association.

The lighting intensity required for foundries is covered by Clause (1) which calls for a minimum of 1 ft.-candle at floor level

An historical survey of illumination progress is given, followed by an interesting series of extracts indicating the present conditions of industrial lighting. Preceding the recommendations proper are sections dealing with the legal aspect of lighting in this and other countries; a short explanation of the principles of vision and illumination; the explanation of technical terms and an excellent summary of the hygienic and economic evils of bad lighting. The factual recommendations of the Committee are distinguished by a remarkably close adherence to current lighting opinion. They deal with the problem in three main sections: Adequacy, suitability, and natural lighting.

Adequacy

The Committee recommends that over all interior working areas of any factory the illumination at floor level, or at 3 ft. below the level at which work is carried on, shall not fall below 1.0 ft.-candle without prejudice to the illumination required for the work itself. The working area is defined as "the area occupied by, and in the immediate vicinity of, the machines, or other plant at which the operatives stand or sit in the execution of their work, including the intervening gangways, alleys, and similar spaces."

Realising the difficulty caused by unavoidable obstruction of light by machinery, etc., the Committee says that the general standard should be such as to provide the prescribed minimum over the floor if freed from obstruction. It further recommends that over all interior parts of any factory, other than working areas, over which persons employed are liable to pass, the illumination at floor level shall not fall below 0.5 ft.-candle, and that over all open yards, passages, roadways, and other open places in a factory, upon which persons are employed or over which they are liable to pass, the illumination at ground level or at other level of employment or passage shall not fall below 0.1 ft.-candle, without prejudice to the illumination required for the work itself or for the adequate lighting of dangerous parts and places or other emergency. The Chief Inspector of Factories is to have power to approve a lower standard in appropriate cases.

In one respect the Committee has differed from contemporary opinion; it withholds recommendation regarding legal minima for the lighting of processes, but proposes to make an immediate investigation with a view to perfecting a method of assessing legal standards for this work. The guidance given on this point is typical of the desire of the Committee to impose no check on industrial lighting development:—

Photographer, J. S. Murray.
Mr. W. Robinson is with the Lighting Service Bureau

"For the guidance of persons interested in selecting appropriate standards of process lighting, it is stressed that the values proposed by the various technical organisations consulted (Appendix A) indicate that in many cases values considerably in excess of those recommended in the Third Report of the Committee (1922) are now usual. For purposes of design, reference may be made to the tables of recommended values for various processes and uses now published by such bodies as the Illuminating Engineering Society and the Electric Lamp Manufacturers' Association."

Suitability

The suitability of lighting is dealt with largely by recommendations to prevent glare. The Committee recommends that where any light source in a factory is less than 16 ft. high above floor level, no part of the source or fitting having a brightness greater than 10 candles per sq. in. shall be visible to any person whilst normally employed within 100 ft. of the source, unless the angle of elevation from the eye to the source exceeds 20 deg., and provides a very useful table interpreting its requirements in terms of height of source and its distance from the worker. It further recommends that all local light sources in a factory shall be provided with suitable shades of opaque material or other effective means by which they shall be completely screened from the eyes of every person employed at a normal working place. Adequate means shall be provided, as far as reasonably practicable, by suitable screening or placing or other effective method to prevent discomfort or injury by the reflection of light from smooth or polished surfaces into the eyes of the worker.

Mandatory lighting requirements will be satisfactorily met in such typical cases as this by a well-designed general overhead system of dispersive reflectors

Regarding shadows, it is recommended that adequate means

shall be taken, as far as reasonably practicable, to prevent the formation of shadows which interfere with the safety of, or cause discomfort to, any person employed.

The Committee concludes its recommendations regarding suitability of lighting by proposing that no light source which flickers or undergoes abrupt changes in candle-power in such

A typical works road which will now require a minimum of 0.1 ft.-candle. The illumination of this particular road is considerably in excess of this

a manner as to interfere with the safety or efficiency of any person employed shall be used for illumination of a factory, but qualifies this by saying that it does not intend that this prohibition shall apply to gaseous discharge or other electric lamps operating on a supply frequency of 50 or more cycles per second, unless it is established that stroboscopic or other effects create discomfort or dangerous optical illusion.

The recommendation regarding natural lighting is of immense significance and virtually removes from artificial lighting the stigma of being merely a poor substitute for daylight. It is proposed that when the daylight illumination does not reach the minimum specified in the recommendation, continuous supplementary artificial lighting should be compulsory.

Finally, it is recommended that the proposed standards shall be enforced in all factory premises in which Section 5 of the Factories Act, 1937, is applicable from July 1st, 1939, with exceptions in special cases.

Interpretation

The Committee is careful to direct attention to the need for a true perspective of its Report. It says that it considers it important to emphasise that its proposals should not be interpreted or quoted as standards of recommended good practice. They represent only the least values of general lighting that it considers acceptable as effective legal minima, and as such are necessarily lower than the desirable standards of good lighting practice.

The Report proper then concludes with a number of heartening statements and some good advice. Again, one cannot do better than quote from it:—

"... much progress has been achieved in artificial lighting of factories generally. ... Concomitantly with increased standards, reduction in lighting cost has been considerable. ... The advent of statutory requirements must inevitably widen the attention paid to conditions of industrial lighting. We hope that it will arouse also interest and appreciation of the importance of this subject, and that, with increasing frequency, effort will be directed towards the attainment of desirable standards rather than mere legal minima. We are confident that the benefits obtained usually far outweigh the cost involved."

The appendices that follow the Report are interesting, and particularly Appendix 4, which tabulates the recommendations of the leading technical organisations which submitted evidence.

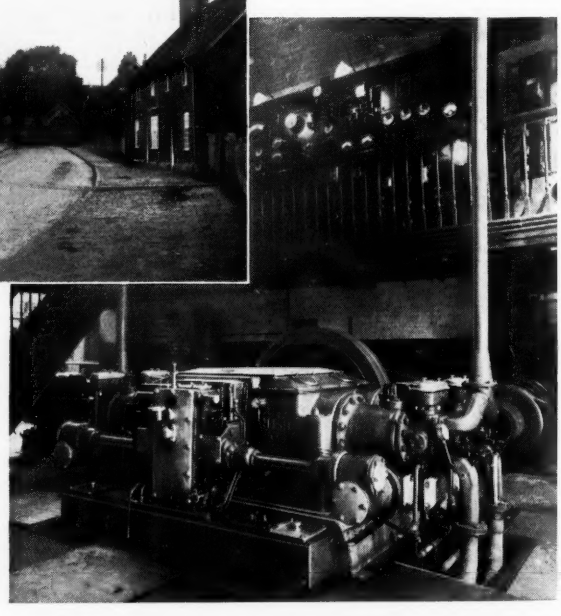
It can safely be said that this eagerly awaited Report is very acceptable. The Committee's recommendations are well in excess of previous proposals, and, at the risk of using a hackneyed phrase, they do mark a great step forward in factory lighting. Above all, there has been avoided the danger that always exists with technical legislation—the danger of throttling instead of inspiring development.

Private Rural Supply

Estate and Village Scheme

THE recent inauguration of a private generating station at Hursley Park, near Winchester, for supplying the farms and for power purposes on the estate, in addition to the mansion, has been followed by an extension of the supply to the village of Hursley.

The generating station, situated approximately one mile from the village, houses two four-cylinder 160-BHP horizontal opposed-cylinder Diesel engines driving 90-kW DC generators and 50-kVA alternators and a 64-BHP engine driving a third 50-kVA alternator. AC at 2,000 V is transmitted by a three-core underground cable to a distribution centre at the village where a three-phase transformer supplies two low-voltage distributors feeding the village, and three single-phase overhead lines which serve three outlying hamlets.



Above: Hursley village. Right: Some of the generating plant

There are 135 houses in the village and several old buildings containing numerous oak beams, including the historic Hursley Church, which is illuminated on the semi-concealed reflectors system. About 40 kW is connected, there being some 1,500 lighting points wired with "Liverpool C.M.A." twin lead-covered cable, with "Britmac" switches and plugs, and "Mazda" lamps.

The installation of the main cable and the services consisting of concentric overhead cables has been carried out by the Hursley estate workmen under the supervision of Pirelli-General Cable Works, Ltd., which provided the material.

The main high-voltage feeder was laid in a trench excavated by a plough made in the estate workshops. All overhead line poles were felled, fabricated and creosoted under pressure on the estate. The generating sets, switchboard and transformer were supplied by the Brush Electrical Engineering Co., Ltd. The internal wiring has been carried out by H. J. Read, electrical contractor, of Farnham. The engineering work has been planned and carried out under the supervision of the estate engineer, Mr. A. Copeland, and the whole expense of the installation has been borne by Sir George Cooper. The supply to the village was recently inaugurated by Lady Cooper.

Poplar Town Hall

Up-to-date lighting and thermal storage heating systems

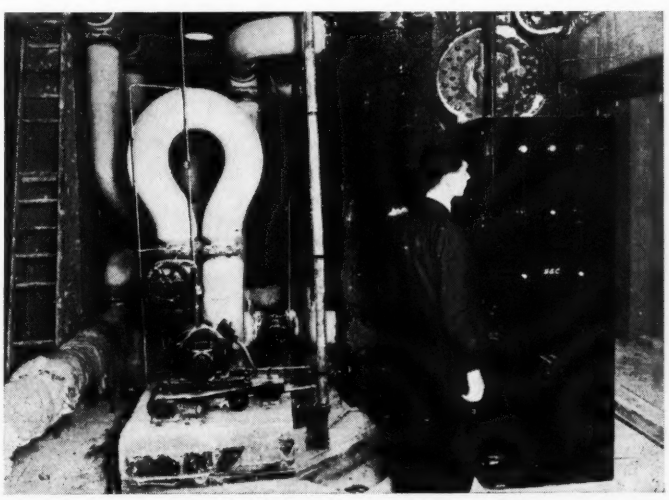
FOR public buildings, perhaps more than other large premises, electric thermal storage is becoming rapidly recognised as being the most economical and convenient medium of heating. Its off-peak characteristics render it especially favoured by the electricity supply undertakings, which are enabled to offer energy at "bargain prices." Municipalities possessing their own electricity supply undertakings are particularly fortunate in this respect, and naturally have a further incentive for adopting this "flexible" form of heating.

At the new Poplar Town Hall to be officially opened tomorrow (Saturday), electricity is supplied for heating at the specially low off-peak rate of ¼d. per kWh, plus the Central Electricity Board's coal clause charge. The two 650-kW, high-voltage G.E.C. electrode boilers used are of a comparatively new type employed in only two or three installations previously. They operate at 6,300 V, the water being heated in a series of water channels formed in stacks of porcelain bricks. The load is regulated by means of quartz shields which cover the cast-iron electrodes, and which are operated by means of an external motor.

Operation is completely automatic, and the load is maintained constant by means of the adjustable shields at any predetermined setting from 30 to 100 per cent. When any desired temperature is reached in the storage cylinders the boilers automatically shut down. The control of the boilers is also dependent on a time switch, which is set to operate during periods of minimum loading on the undertaking. Before starting up or shutting down a boiler, the electrode shields are automatically run to the minimum loading position so that the load can be raised or lowered gradually.

The design of the water channels in the boiler is dependent on the resistance of the water, and as the natural resistance of the town mains water is lower than the ideal operating resistance, a 100-kW distilling plant has been provided for increasing the resistance of the stored water. The energy used for distilling is transferred as heat to the main storage system, and the use of the distilling plant provides purer water and minimises scaling.

Facilities are provided for feeding the hot water from either of the boilers to either of two 15,000-gal. storage cylinders, two Pulsometer primary pumps driven by 1.5-HP, 925-RPM Bull "Super-Silent" motors being employed for this purpose. The normal range of temperature of the stored water is from 140 deg. to 250 deg. F., and a modulator or mixing valve between the boilers and storage cylinders enables the water to be circulated through the boilers and only transferred to the storage cylinders at a predetermined adjustable temperature.



[Elec. Rev. photo.

One of the 650-kW high-voltage G.E.C. electrode boilers and its control panel.

Circulation of the hot water from the storage cylinders throughout the building is effected by means of two 2.5-HP, 710-RPM Bull motors, *via* a modulator valve, which regulates the temperature of the water circulated. Individual boiler control panels are mounted one on each side of a temperature control panel to form a neat and compact control unit (G.E.C.). Mounted on the temperature control panel is a Negretti and Zambra twenty-point distance temperature indicator and recorder.

The heating of the office block is provided by water circulation in radiators, while three sets of plenum plant are used for heating and air-conditioning the Assembly Hall, Council Chamber and Committee Rooms. In the Council Chamber the main air inlets are situated behind decorative grilles about 8 ft. from the floor, there being additional insets at the side of the dais. The air is extracted by means of outlets concealed in the ceiling coves and cornices. All the plenum motors for driving pumps, intake and extract fans are of Bull

[Elec. Rev. photo.

manufacture, and Brookhirst starters and regulators are used.

Apart from the heating, perhaps the most striking feature of the electrical installation is the equipment of the Assembly Hall. Seating 1,400, this has been equipped as a modern theatre, with extra facilities for use as a cinema or dance hall. The main auditorium lighting consists of concealed trough lighting arranged behind the architecturally designed ceiling in four tiers, with further concealed troughs round the proscenium and under the balcony. This is supplemented by a line of circular lighting units mounted on the ceiling at the rear of the auditorium, with two lines of similar units under the balcony. In addition, there is a most attractive lighting effect obtained on one side of the hall by the use of specially constructed lighting units built in above and below figured glass windows to bring out the natural colour of the glass in the illuminated design.

Semi-flush lighting units have been built in to the ceiling design of the main foyer, twenty-eight of these fittings having been arranged to alternate with the plenum extract louvres. The lighting of the upper foyer is effected by means of a specially constructed circular trough built in to the ceiling, supplemented by circular flush and semi-flush fittings on the staircases. Spun bronze wall brackets have been installed in the balcony foyer, while cornice lighting provides the main source of illumination in the ground floor all-electric refreshment room. Spherical fittings in specially constructed coffers combined with curtain lighting have been installed in a similar refreshment room on the second floor.

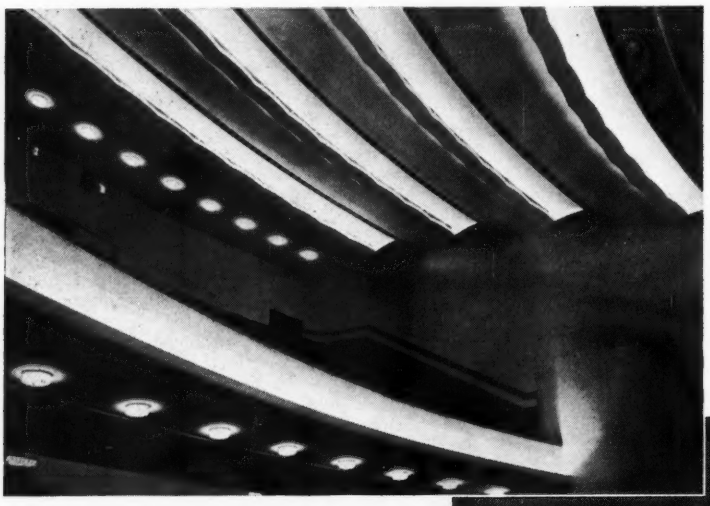
The stage can be built out over the orchestra pit, and the equipment includes a four-colour stage lighting control board, the dimmers being hand-operated, either individually or ganged. Slow motion facilities are also provided. A main black-out switch controls the supply to colour master switches, two front of house spot-lights and two dance floor spot-lights. The stage board supplies footlights, two battens, two sets of wing floods, and a special cyclorama batten, all arranged for four-colour operation.

The main auditorium lighting is controlled by a motor-driven, push-button operated dimmer board installed adjacent to the stage door. The whole of this equipment was supplied by the Major Equipment Co., Ltd. The auditorium lighting and the electrically operated stage curtain are remote controlled at the stage switchboard position and in the projection room. Public address and loud speaker equipment (E.M.I.) has been arranged in specially constructed resonators on each side of the proscenium, the twin turntable control manual being situated under the stage board. The emergency lighting takes the form of louvre fittings and wall panels with

extra brackets at the rear of the balcony, and is derived from an automatic unit employing a Mawdsley motor generator set, control panel and "Nife" batteries, the whole equipment having been supplied by Batteries, Ltd.

The Civic Suite has also received special architectural treatment. The lighting of the Council Chamber consists of a massive semi-indirect centre pendant unit encircled by a large ceiling cove, surrounded by sixteen circular flush fittings. This is supplemented by cornice and curtain lighting along the front of the room and over both the large windows, with further cornice lighting for the public gallery, and special tubular lighting arranged on the underside of the gallery to illuminate maps and plans, &c., hung on a specially prepared wall.

Three committee rooms, which can be opened out into one large room by means of folding doors, are each equipped with four smaller semi-indirect lighting units, each fitted into its own cove, while at the two extreme ends map lighting is again provided by concealed troughs. The Mayor's Parlour also has a semi-indirect unit as the central lighting feature, supplemented by special laylighting above the window to illuminate the curtains. Novel three-tier fittings are installed in the Lady Members' Room with a laylight in a reading recess, while in the Male Members' Room subdued illumination is secured by concealed lighting in four rectangular slots in the ceiling, with a further laylight in a reading recess. Semi-indirect units in coves have again been employed in the foyer of the Civic Suite.



[*Elec. Rev. photos.*

Concealed trough lighting arranged behind the architecturally designed ceiling in four tiers provides the main illumination of the Assembly Hall auditorium (above), while in the main foyer (right) semi-flush ceiling units have been alternated with the plenum extract louvres

For the Administration Block, totally enclosed spherical opal fittings have been installed for general office lighting, the chief officers' rooms being provided with more decorative semi-indirect units and supplemented in all instances by special map and plan-table lighting in the form of trough or laylights. The corridors and staircases are illuminated by very attractive opal dish fittings on a cellulosed surround mounted direct on to the ceiling. The special lighting fittings required throughout the building were supplied by Harcourts, Ltd., and C. A. Harvey & Co. (London), Ltd. Troughton and Young tubular units and "Ultralux" brackets have been used for mirror illumination in all the lavatories. A general illumination of approximately 10 ft.-candles was aimed at.

Hot-water requirements in the lavatories are catered for by approximately twenty-five G.E.C. water heaters ranging in size from 10 to 25 gals., all thermostatically controlled. Ferranti synchronous clocks are fitted throughout the building, the dials were specially designed by the architect to harmonise with the decorative scheme in its particular location. A private automatic branch telephone exchange system serves the administration block (100 lines), while a smaller automatic telephone system is installed for the Assembly Hall. Both equipments were supplied and installed by Standard Telephones & Cables, Ltd.

Of four passenger lifts, serving the Administration Block, one runs direct to the Electricity Department on the top floor. A chair hoist and a goods lift serve the Assembly Hall; all six equipments were supplied by Marryat & Scott. A two-colour electric discharge exterior lighting installation was carried out by Maple & Co., and special decorative "Tricity" electric radiator units were supplied by L. G. Hawkins & Co.

A 6,300-V, three-phase supply is fed to the building by means of two 0.2-sq. in. ring main feeders, and housed in the main intake room is a seven-panel metal-clad switchboard (G.E.C.) with circuit-breakers having a rupturing capacity of 150,000 kVA. In this intake room there are two 300-kVA, G.E.C. transformers for providing a low-voltage supply at 400/230 V, and an English Electric low-voltage feeder board with three outgoing low-voltage feeders, one for the intake room for the Public Hall, one for the intake room serving the Administration Block, and one to the boiler house auxiliary board supplied by Electrical Installations, Ltd.

The Assembly Hall and Administration Block have separate low-voltage intake chambers. In each of these is installed a main distribution panel arranged for floor mounting, comprising two 3-phase, 4-wire busbar sections, each controlled by a 300-A, triple-pole combination switch-fuse, one for lighting and one for power. The various outgoing supply services are controlled by switch-fuses mounted above and below the busbar section. The whole of the equipment was supplied by the English Electric Co. and incorporates h.r.c. fuses.

In addition to the main metering for the administration block services, check meters have been installed, so that each service is separately metered. The meters (Metrovick) have been accommodated in specially constructed sheet steel containers mounted direct on to the sub-main switch fuses. Low-voltage summation metering equipment is mounted in the main intake room.

In addition to the equipment already mentioned, the following manufacturers have supplied materials: Simplex Electric Co. (distribution fuse boards); Hackbridge Cable Co. (cable); M.K. Electric (plugs and sockets); Crabtree & Co. (lighting switches); Cryselco (lamps); J. Stott & Co. (electric urns); and Imperial Signs (electric directional signs).

Electrical Installations, Ltd., were the electrical contractors, Mr. R. Ilingworth, the borough electrical engineer, acting as electrical consultant. The main heating and ventilating contractors were Donald Smith & Co., Ltd., and J. Roger Preston and Partners being the consulting engineers for the heating. The architects were Culpin & Son.

Boiler Contracts

YARROW & CO., LTD., have received an order from Plymouth, subject to confirmation when the Electricity Commissioners' sanction is received, for two Yarrow patent land type water tube boilers for the Prince Rock power station. In addition to the boilers, the order includes the boilerhouse building and complete equipment of mechanical stokers, superheaters, economisers, air-heaters, forced and induced draught fans, coal handling plant, &c. Each boiler has a maximum continuous rating of 100,000 lb. per hour with a working pressure of 425 lb. per sq. in. and steam superheated to 825 deg. F. A further order has been received by the company for a Yarrow test boiler and superheater with other items of plant for the Admiralty.

Meetings and Discussions

Among the subjects discussed at recent I.E.E. meetings have been the growing use of electricity in mines (paper by Mr. R. Nelson), methods of serving densely loaded areas (introduced by Mr. J. W. Leach), electron-beam control (a students' paper by Mr. D. J. Mynall) and heating on board ship—the discussion on Mr. H. C. MacEwan's paper mentioned in our last issue. Electrical accidents were analysed at a joint meeting of the A.S.E.E. and the Institution of Engineers in Charge by Mr. A. L. Whittenham, who suggested means of reducing them

Power for Mines

AN attempt to forecast probable future developments in the uses of electricity in coal mines is made in the paper by Mr. R. Nelson (Messrs. McLellan & Partners) read at the INSTITUTION OF ELECTRICAL ENGINEERS in London on December 1st.

A retrospective review is followed by a statistical summary of the present state of the industry, which shows how greatly it has been aided by mechanised mining and mechanical coal-sorting. Indeed, means of increasing the output of the individual worker as an aid to cost reduction is of special importance in mining, because labour represents very nearly 66 per cent. of the total cost of production.

Thus electricity has now become almost an essential agent in nearly all operations of importance at a modern colliery. Systematic stone-dusting has been the means of minimising the spread of an explosion of gas or coal dust and with its use miners' opposition to the employment of electricity has lessened; but it has not yet disappeared. The application of electricity, though needing care, is entirely without inconvenience to the working miner.

Power is commonly transmitted underground as three-phase AC at 3,000 V and distributed at from 400 to 650 V. The average of motors installed per colliery has grown to 1,592 HP and there are some with 7,000 HP (or 10,000 HP when an electric winder is used). In the Nottingham coalfield there is one colliery with 10,240 HP, of which 8,850 HP is on the surface, while below ground 700 HP is used for haulage, 190 HP for pumping, 300 HP for coal cutting and 200 HP for coal conveying. A similarly equipped neighbouring colliery has 50 per cent. more HP of coal-cutting machinery.

In 1937 there were 2,120 mines at work, of which 1,358 used electricity for power purposes. Most of the remaining 750 were small mines, mainly on the fringes of certain coalfields. Motors installed totalled 2,162,000 HP, of which 53 per cent. was below ground. The following table shows the allocation :—

1937	HP	%
Above ground :		
Winding...	165,787	7.66
Haulage	86,670	4.00
Ventilation	129,073	5.96
Other purposes	628,820	29.10
Below ground :		
Haulage	457,389	21.15
Pumping	427,084	19.75
Coal cutting and conveying ...	226,551	10.48
Other purposes	40,641	1.90

The number of pit ponies in service has fallen to 33,000, a reduction of 40,000 in 24 years. For coal cutting the use of both compressed air and electricity is increasing, the latter more rapidly. In 1937 more than 137 million tons of coal, or 57 per cent. of the total output, was machine cut. Over 97 million tons, more than 70 per cent. of the total, was cut by electricity. But in that same year more than 13 million tons of coal was won by the use of pneumatic picks, to which there is no electrical equivalent. This compares with 4 million tons in 1932. Compressed air is also used much more extensively than electricity for rock-drilling. In 1937 there were 8,031 conveyors and loaders in use, of which 60 per cent. was electrically driven, and 123 million tons, 51 per cent. of the total output, was mechanically conveyed.

Mechanisation and diminished output (25 million tons per year less than in 1908) mean that fewer miners are employed and therefore fewer hand lamps are needed. In 1937 there were 462,402 electric and 177,048 oil safety lamps in use. According to the official returns there were in 1937 some 93,000 lamps connected to distribution mains below ground. Of these, 46 per cent. was used at shaft insets and siding, 25 per cent. on roadways, and the balance of 29 per cent. in cabins, stables and motor rooms. The number of lamps fed from distribution mains in use at the coal-face in 1937 was returned as 41. Having regard to the importance of this matter, both the number of lamps in use and the rate of growth of mains-lighting below ground are surprisingly low. Apart from mains-lighting there were in use at or near the coal-face 1,850 self-contained lighting units, each consisting of a magneto-generator driven by a small compressed-air turbine.

In touching upon accident statistics the author records that during the ten years ended 1936 inclusive electricity was responsible for 224 out of 8,656 deaths, or 2¼ per cent. of the total loss of life in the pits. The position in respect of the number of electrical accidents has not improved during recent years, but at the same time the number of men exposed to the risk of electrical accident has steadily increased year by year during that period.

It is pointed out that there still remains more than one million HP of driven machinery to be electrified. The author believes that the influence of the national grid will tend to increase the number of all-electric collieries, and encourage the purchase of electricity as opposed to its generation privately. It may not always be appreciated that a saving of 50 per cent. or more in the cost of power may not mean more than a very small saving per ton in the cost of coal won. For instance, an average saving of 0.5d. per ton on 240 million tons of coal raised would represent less than 0.25 per cent. saving in the pit-head price of the coal, but would nevertheless be a saving to the coal industry of more than £500,000 per annum.

In 1937 some 12 million tons of coal was burnt under colliery boilers for generating power, which is only 2¼ million tons less than the amount of coal used to generate the whole of the electricity used for general supply purposes throughout the country. It has been estimated that if the whole of the collieries were electrified the annual consumption would be of the order of 5,500 million kWh, almost exactly one-quarter of the total amount generated in the public electricity supply stations in 1937.

Coal and Power Boards Suggested

The author believes that greater co-operation would materially benefit both parties and, through them, provide cheaper power for industry in general. He suggests the setting up in each coalfield of a correlating board, the executive function of which would be so to control production as to provide at fixed cost the approximate quantity of the kind of fuel needed for power generation. The advantage to the collieries would be a market for low-grade fuel, coupled with power "on tap" at schedule rates for all collieries in the particular field. Thus each industry would obtain from the other favourable terms and, so far as each affects the other, more stable conditions.

Co-operation by omnibus agreement on lines such as these is envisaged by the author as a possible future development. He concludes with an appeal to electrical engineers to win the confidence of miners, venturing to remind those directly concerned with the distribution and use of electricity below ground that underground workmen are still, for the most part, completely ignorant of electricity. It represents to them a risk which they are unable to measure by ordinary standards. The colliery electrical engineer has therefore an unusual opportunity. The task of alleviating the miner's mistrust rests more clearly upon him than upon any other colliery official.

Conditions in Densely Loaded Areas

LOW-VOLTAGE short-circuit conditions in densely loaded areas received consideration at an informal meeting of the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 21st.

Mr. J. W. Leach, in his introductory remarks, described the distribution network in a large strip of central London where in some parts the loading is of the order of 1.5 kW per yard of frontage and where 1,000 kW actual load per building is quite common. He expressed the opinion that the achievement of any further reduction in the cost of electricity generation would be slow, but the economics of distribution had not received the same concentrated attention.

The ideal system appeared to be one wherein the area could be overlaid with a low voltage symmetrical grid at the voltage of supply to the consumer with injections made into this grid from a primary high-voltage network through decentralised transforming plants utilising units approximating in rating to, and in the position of, the load of the larger consumers. In order to make the best use of the installed copper with the minimum of losses and the best voltage regulation, this grid should be solidly connected.

The system utilised a low-voltage main distributor (or distributors) associated with a high-voltage feeder, injections by means of relatively small transformers being made from high to low voltage in accordance with local load demand and in normal circumstances the section of the low-voltage distributor was never reinforced.

The transformers were mostly on the premises of large consumers and paralleled on both the high and low sides with their respective networks, the heavy loads being fed in this way direct from the high-voltage net-work; the low-voltage network losses were thus considerably reduced.

This system of distribution was considered to be the most economical in capital costs of land, buildings and plant, and spare plant; in copper losses, and space occupied in, and disturbance of, the footways. It had the added advantage that increases of plant were only made when and where required to meet known additional load and the failure of expected load growth to materialise had not involved any wasted expenditure in preparations in the way of large distribution sub-stations and plant installed in advance, to meet the forecasts of load.

Mr. Leach's concluding remarks and much of the discussion dealt with the protection and discrimination of high rupturing capacity fuses, about which information was said to be limited, especially with regard to the small sizes, in which cases some of the required characteristics were diametrically opposed.

Heating Ships Electrically

NUMEROUS variable factors, some of which are awkward to determine, which have to be taken into account when designing electric heating installations for ships were stressed during the discussion of Mr. H. Camden MacEwan's paper (to which reference was made last week) at the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 24th.

Mr. G. O. Watson commenced the discussion by describing the paper as a store of data and information; it was pleasing to learn that seamen's quarters were being given prior consideration. He emphasised that the degree of comfort obtainable was governed by a very small range of temperatures. Lloyd's Committee was prepared to modify its rules for the installation of heaters whenever it could be proved safe to do so. Even a convector could cause trouble if clothes were thrown over it, the remedy being an internal fuse or thermostatic control. Fuses were not satisfactory in crew's quarters, however, since there was the risk of over-fusing. There were possibilities in some combination of radiated and convected heating.

In Canada, where houses were largely built of wood, the regulations were so strict as almost to prevent the employment of radiators. Electric hot water radiators were a possible solution of the problem in crew's quarters where appearance was not of great importance and heat was needed all day long. Pilot lamps on convectors were very desirable and could be made to provide some visual effect. Official circuit fusing requirements might be relaxed quite soon. Passageways into crew's quarters might be fitted with double doors, to minimise the escape of warm air.

Requirements for Comfort

Mr. J. W. Kempster preferred to deal with facts rather than theories, since there were so many variable factors to be contended with in ships, while the range of heat loss was extremely wide. Ten to fifteen changes of air per hour would be more near the requirements than the author's three changes, which was insufficient for comfort. Cold air should never be admitted; it should be warmed or conditioned. One of the defects of electric heaters was that they were not self-regulating; much better results were obtainable with thermostatic control.

Most first-class ships were fitted with air trunks and ducts, and their cost would be the same whether cold or warmed air were used for ventilating purposes. Air temperature alone was not a criterion; movement of air was necessary and regulation of humidity was essential for comfort. This might be a little expensive, but it was needed and best carried out by a central plant. These requirements were physical, not physiological. Radiant heaters were best, but their application involved difficulties. Some form of good lagging was needed for ships' metalwork in order to reduce the amount of wooden panelling employed.

Mr. I. Lipman said that heat insulation was most valuable and would pay for itself in a very short time. It would be difficult to apply the plenum system of ventilation with warmed air if the ducts needed thermal insulation. A better way would be to apply the heat to the air at the exit terminals of the ducting. Electrical convectors were available for building into panelling and cupboards without risk of raising the temperature behind them because three air jackets were used, each cooling the previous one. Portable convectors would be suitable for boosting temperature in passenger accommodation.

Mr. Saunders, speaking broadly, said that the heating of ships was bound up with the fire risk and so wrapped up with ventilation. Heat should be admitted together with air, the heaters being built in at the points of inlet to the cabins so as to provide for individual control, since no two passengers were alike in their requirements.

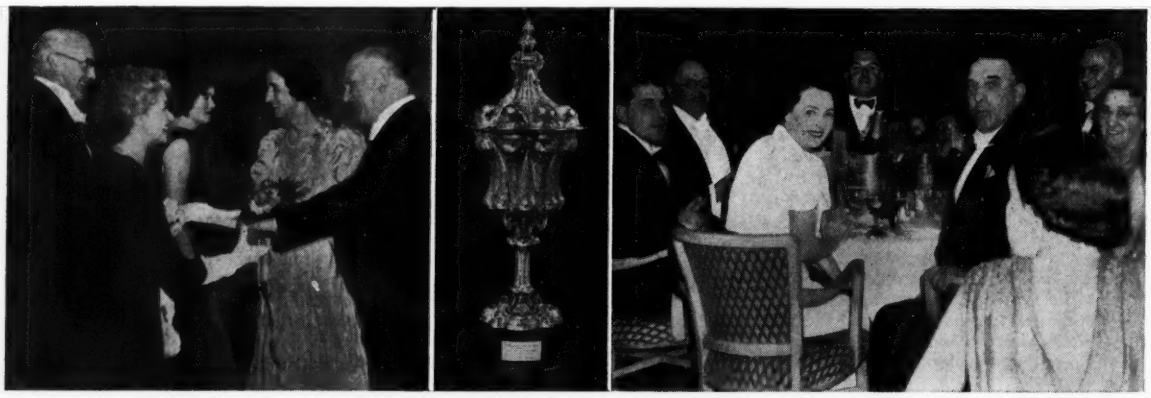
Author's Reply

The author, in reply, pointed out that the rate of loss of stored heat from a ship was much less in port than when at sea. If hot water were used, the colder the weather the colder would the radiators become; also, there was the risk of the water freezing when not in use. If heaters were inserted in air ducting, some form of interlocking would be necessary to prevent the overheating of paint and objectionable odours. Small heaters in passenger cabins with individual control were most desirable. A warmed air system might be cheaper than electric heating if passengers could be induced to control the air flow (which the author doubted), otherwise there would be excessive waste of warmed air. The objection to portable heaters on ships was that they might be knocked, or fall, over. When writing his paper he had purposely adopted a conservative attitude to avoid being accused of exaggerations.

Control of Electron Beams

THE control of electron beams, with particular reference to television, was the subject of a paper presented by Mr. D. J. Mynall at a meeting of the South Midland Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS at Rugby on November 23rd and repeated at Birmingham on November 30th.

The author first explained, with optical analogies, how such beams were formed and what they could be made to do in the way of translating electrical signals into visual forms with extreme rapidity. He next dealt with electron beam focusing and modulating systems, intimating that the design of electrostatic systems was usually quasi-experimental. A



At last week's E.I.B.A. Ball

Left: The President (Mr. E. E. Sharp) and Mrs. Sharp receiving Mr. and Mrs. E. Leete. Centre: The golf trophy presented by Sir Montague Hughman. Right: Dr. and Mrs. L. Freeman (Aron Meter), Mr. and Mrs. A. E. McKenzie (Wimbledon) and Mr. P. N. Rand and guests

mathematical approach was useful, but became too unwieldly to deal completely with practical boundary conditions. The behaviour of new designs was often checked by specially built cathode-ray tubes with movable electrodes, or perforated diaphragms, by means of which different rays in the beam might be traced. Electron path tracers were being developed with the object of tracing electron trajectories through a scale model of the system under consideration, the model being immersed in an electrolytic bath.

The magnetostatic electron optical analogy was not obvious, but nevertheless existed. In this case the electron always rotated about the axis in its path through the "lens," and made path-tracing difficult. It was, however, an experimental fact that the aberrations in magnetostatic "lenses" were comparatively small. This fact, coupled with the ease of constructing and experimenting with such "lens" systems, made the direct experimental approach relatively easy.

The author's conclusion was that, at the moment, magnetostatic methods were superior for both focusing and deflection, though this position might become modified as the correction of aberrations in electrostatic systems became better understood.

Electricity in Agriculture

AT last Monday's meeting of the BIRMINGHAM ELECTRIC CLUB Mr. F. E. Rowland (G.E.C.) gave an address on the applications of electricity in agriculture and horticulture. He dealt first with lighting and stressed the necessity of installing an adequate number of points in the correct positions and employing the proper fittings.

The electric motor was a most convenient form of power and would give many years of reliable service. It would start at the touch of a switch, even on the coldest mornings. Mr. Rowland went on to describe the various methods of employing the motors—with belting, countershafts or individually. A useful size, he said, was 7.5 HP.

Independent tests at Rothamsted had shown that electricity at 1.85d. per kWh compared favourably with tractor drive for threshing.

The benefits to be derived from electricity on the poultry farm and in greenhouses were dealt with at some length.

How Accidents Happen

THE relation of electrical installation systems to personal safety and fire risk was discussed in the paper by Mr. A. L. Whittenham that was read in London on November 23rd at a joint meeting of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS and the INSTITUTION OF ENGINEERS IN CHARGE.

In the author's opinion the risk of shock was smaller than that of fire, but he pointed out that though the number of installations was steadily growing, accidents and fires of electrical origin were not increasing at the same rate. Therefore a fitting sense of proportion must be maintained.

He excluded from this consideration the special risks involved in mining and industrial premises. So far as could be ascertained, fatalities in domestic and similar premises averaged twenty-seven annually. In factories and industrial premises the average was thirty-one, excluding fatalities on civil engineering contracts, mines, quarries, main distribution lines, &c.

In domestic and similar premises over 75 per cent. of the fatal accidents occurred with portable apparatus and flexible cords, while only 13 per cent. occurred on the fixed part of the installations in the houses. In industrial installations portable equipment accounted for a little over 20 per cent. of the fatal accidents. In domestic premises 16 per cent. of the accidents occurred with portable lamps and lampholders, 24 per cent. with heaters and irons and 15 per cent. with other portable appliances such as vacuum cleaners, hair dryers, fans, &c. There must be more than three heaters and irons in use to every two portable lamps. It could hardly be maintained that the quality of portable lamps was such that they became dangerous more readily than portable fires and irons. It therefore seemed probable that the relatively higher figures for portable lamps were due to the widespread use of low-grade flexible cord. Quality was probably a secondary consideration, while lack of maintenance and improper use due to ignorance or negligence were further important factors. In bathrooms an average of five fatal accidents per annum occurred, mostly clear cases of misuse.

Factories and industrial premises presented a very different picture. Not less than one in three accidents occurred on switch and control gear, about 15 per cent. on crane trolley wires and 20 per cent. with portable apparatus. By using transformers wound to give not more than 50 V to earth the safety of portable apparatus was very considerably enhanced without sacrifice of efficiency. Regarding switchgear and crane trolley wires, there was an obligation not only to see that isolating gear was provided and readily accessible, but to see that in fact it was used.

A curious feature of some reports from large cities which the author had examined was that 8 per cent. of the total number of electrical fires occurred in refrigerators, and only about 4 per cent. in motors generally. Refrigerators under automatic control could be expected to run unattended for long periods. Hence, if a fire did start, there was a strong probability that it would get a good hold before it was discovered. Fuses alone were not necessarily effective.

Luminous tube installations were responsible for about 10 per cent. of electrical fires. An appreciable number annually was caused by the melting of "compo" pipes carrying gas, generally the result of intermittent or point contact between the pipe and electrical conduit, cable or earth wire.

With suspension switches and the like the load was in series with both cores of the flexible cord, so that a short-circuit between such cores did not cause the fuse to blow; hence ceiling switches were obviously an improvement. There did appear to be less risk arising from AC systems, but it was impossible to be dogmatic since many of the DC installations were comparatively old, and more subject to fire risk.

Short-circuit and overload currents differed only in magnitude; they were not separate entities. Therefore motors should be protected by fuses against short-circuits and by thermal or magnetic relays against sustained overloads of the smaller magnitudes. The author expressed the opinion that earthing as practised in this country should not be abandoned because simple and cheap earth-leakage trips (circuit-breakers) were now available. These were valuable additions to protective gear, but much had yet to be learned about their limitations.

Forthcoming Events

Institution of Electrical Engineers.—Monday, December 5th. Institution, London, W.C.2. 6.30 p.m. Informal meeting. Discussion on "Electrical Welding as Applied to Structures," to be opened by Dr. J. H. Paterson.

Wireless Section.—Wednesday, December 7th. Institution, London, W.C.2. 6 p.m. "Long Feeders for Transmitting Wide Side-Bands, with reference to the Alexandra Palace Aerial-Feeder System," by Messrs. E. C. Cork and J. L. Pawsey. "E.M.I. Cathode-Ray Television Transmission Tubes," by Drs. J. D. McGee and H. G. Lubszynski.

Meter and Instrument Section.—Friday, December 9th. Institution, London, W.C.2. 7 p.m. Joint meeting with the Physical Society. Discussion on "Electro-Acoustics," to be opened by Dr. C. V. Drysdale.

South Midland Centre.—Monday, December 5th. James Watt Memorial Institute, Birmingham. 7 p.m. Joint meeting with the Institution of P.O.E E. "The London Television Service," by Messrs. T. C. Macnamara and D. C. Birkinshaw. "The Marconi-E.M.I. Television System," by Messrs. A. D. Blumlein, C. O. Browne, N. E. Davis and E. Green.

North Midland Centre.—Tuesday, December 6th. Hotel Metropole, King Street, Leeds. 7 p.m. "Long Period Ageing Tests on Solid-Type Cable," by Messrs. T. R. Scott and R. C. Mildner.

East Midland Sub-Centre.—Tuesday, December 6th. University College, Nottingham. Joint meeting with the Nottingham Society of Engineers, the Institute of Fuel and the Association of Mining Electrical Engineers. "Electricity in Coal Mines," by Mr. R. Nelson.

North-Eastern Centre.—Wednesday, December 7th. Royal Station Hotel, Newcastle-on-Tyne. 7.30 for 8 p.m. Annual dinner.

Tees-Side Sub-Centre.—Wednesday, December 7th. Cleveland Technical Institute, Middlesbrough. 6.45 p.m. "Plastics and Electrical Insulation," by Messrs. L. Hartshorn, N. J. L. Megson and E. Rushton.

Dundee Sub-Centre.—Thursday, December 8th. University College, Dundee. 7.30 p.m. "Electricity in Horticulture," by Mr. A. Monkhouse.

Junior Institution of Engineers.—Friday, December 2nd. 39, Victoria Street, London, S.W.1. 7.30 p.m. "Some Applications of the Thermionic Valve other than for Wireless Purposes," by Mr. H. J. N. Riddle.

Midland Section.—Wednesday, December 7th. James Watt Memorial Institute, Great Charles Street, Birmingham. 6.40 for 7 p.m. "The Engineer of our Time," by Mr. F. W. Lawton.

Association of Supervising Electrical Engineers.—Friday, December 2nd. Electricity Showrooms, Leeds, 1. "Up-to-Date Factory Lighting," by Mr. J. W. Howell.

Association of Mining Electrical Engineers *(West of Scotland Branch).*—Saturday, December 3rd. Annual dinner.

West Wales Branch.—Saturday, December 3rd. "Mechanical Power Transmission," by Mr. Neill Lawson.

Paisley Association of Electrical Engineers.—Tuesday, December 6th. 39, High Street, Paisley. 7.15 p.m. "Points of Interest on Electrical Transmission," by Mr. E. Reid.

Institution of Engineers and Shipbuilders in Scotland.—Tuesday, December 6th. 39, Elmbank Crescent, Glasgow, C.2. "Post Office (London) Railway," by Major W. G. Carter.

Radiological Congress and Exhibition.—Wednesday, Thursday and Friday, December 7th, 8th and 9th. Central Hall, Westminster, S.W.1. Friday, December 9th. Claridge's Hotel, London, W.1. Annual dinner.

"The Old N'ions"—The Northampton Engineering College Past Students' Association.—Friday, December 9th. Cafe Royal, Regent Street, London, W.1. 7.30 for 8 p.m. Annual dinner.

Nottingham Society of Engineers.—Friday, December 9th. Welbeck Hotel, Nottingham. 7 p.m. Annual dinner.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Church Heating

WITH regard to Mr. W. Brian Ewart's letter in your issue of November 25th my remarks regarding "possible overheating" referred not to the suggested electrical scheme but to fuel-fired low-pressure hot-water systems when buildings were fully occupied. Mr. Ewart advocates—in contradiction to recognised practice—the elimination of thermostatic control in favour of hand control and time switch as the most economical method of controlling tubular heating installations. A loading of 18 kW was chosen to give rapid initial heating and was the required amount according to the heat-loss calculations, and 80 W per foot of tubular heaters was adopted to reduce initial costs.

In the course of my experience of installing many thousand feet of 80-W per ft. heaters no difficulty has arisen regarding high surface temperature where reasonable precautions are exercised; in fact, they are often preferred to 60-W tubes owing to the greater radiant heat emission. Time-switch control is a good arrangement provided the required heating times do not vary, and apart from the extra cost of the time-switch and contactors. Hand control should, moreover, be in addition to, and not in lieu of, thermostatic control, as it introduces the human element and cannot, on this account, be expected to be as accurate.

I agree that supply authorities could indicate on their tariff sheets that such installations should be given special consideration provided the standard rate is definitely uneconomical for the purpose. Mr. Ewart arrives at his installed loading of 11 kW for the building in question seemingly without any knowledge of its structure, beyond cubic content, and estimates the running consumption at 2,840 kWh. The uncertainty of the English winter, plus the human element in the way of accurate control, does not permit me to estimate the running costs of such installations within 15 per cent. As to the figure of 185 to 190 deg. F. for the surface temperature of an 80-W per ft. tubular heater, surely such a figure is dependent on surrounding air temperature and local conditions. The estimate received from four prominent tubular-heater manufacturers varies by 30 deg. HEATING ENGINEER.

November 28th.

Electricity on the Farm

The I.E.E. *Journal* for November, just published (page 690) includes the opinion of Mr. H. D. Phelps* that he does "not consider electric ploughing economical owing to the capital cost of overhead lines and trailing cable when £185 will purchase a tractor [oil] with pneumatic tyres." This led me to turn back to the ELECTRICAL REVIEW of November 1st, 1929 (pp. 747-8) where you published a map of a farm at Mungoswells, Drem, East Lothian, where electric ploughing was developed, showing three-phase lines located to suit the requirements of a minimum length of trailing cable, automatically wound up, with a free wheel for unwinding so that no dragging occurred. That was an example of small capital cost of a three-phase line erected by the farmer under expert advice.

Can we learn the average life of the £185 oil-engine tractor? Has Mr. H. D. Phelps considered the relatively long life of electric plough? The oil tractor has a short life. Pneumatic tyres are not limited to oil tractors. In war time the oil tractor might have to stand idle while an electric plough using power from home-produced coal would be greatly independent of oil and usable.

On page 695 *ibid* it is stated that Mr. H. C. Babb's company supplies the average farm with electricity for threshing. That is a grain-growing country and Major McDowall informs me that every farmer has his own thresher and the expense is not very heavy. His own full-size thresher with long-distance chaff blower, grain elevator and belts has a 20-HP motor. It takes the whole load without belt shifting or slip clutch gear and, when running, takes about 15 H.P. For a 50-acre farm in England, one mile from each of three transformers, the authorised supplier has just asked me for a guarantee up to 20 per cent. per annum for a series of years on £600 cost of service connections. On one of the three routes there are 15 cottages and a church, but under Sections 24 and 25 Electric Lighting (Clauses) Act, 1899, the one farm can be held for the guarantee.

The local authority consented to its area being given to the now authorised supplier without exercising the statutory right [Section 3 (1) E.L. Act, 1882] to impose the reasonable condition that in exchange for monopoly of supply the authorised supplier should, within a reasonable time, supply all parts of the area. Parliament gave this protection to all, but I have found only one Special Order in which such protection is included and in that to a limited area only. Whatever the reason for neglect by the local authorities, whether it was ignorance of their statutory right or any other, it is time for Parliament to repeal Sections 24 and 25 of the 1899 Act; also to make the application of Section 6 (f) of the 1882 Act† compulsory; *i.e.*, in any and every part of an authorised area neglected by the supplier, such part should within a short specified time be taken from that supplier and compulsorily assigned to another who reasonably guarantees and gives supply. This will hasten distribution to farms and villages. THEODORE STEVENS.

Herne Bay, *November 27th.*

*It would help if the address and status of each person were given in the *Journal*. The American I.E.E. follows this practice in its reports of discussions.

† 6 (f) includes: "The revocation of the Order or Special Act, where the undertakers have . . . practically failed to carry the powers granted to them into effect."

Sagging Overhead Line Conductors

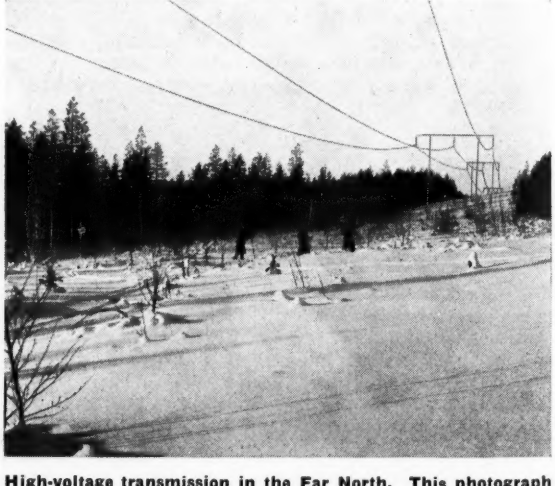
When Dr. John McCombe wrote his article in your issue of November 25th on this subject he failed to appreciate the impracticability of his method if only considered from a cost point of view.

In the first place, I was very amused by his method whereby linesmen can remember the formula: "The number of vibrations per minute is equal to the square root of ten times the number of days in the year over the sag." Personally, I have yet to meet the linesman who could memorise such a formula, let alone work it out correctly; my experience has been that linesmen much prefer anything that savours of technicalities to be as condensed and simplified as possible, and this was confirmed when I introduced Dr. McCombe's article to a construction gang and asked for their comments, which forcibly proved that the vibration method would not be popular. It would also be necessary for linesmen to be issued with stop watches, and one can visualise the life of these watches in constant use on pole tops.

The method appears to be a trial and error one, *e.g.*, "if the number of vibrations is greater than 26 then the conductor is too tight and it is necessary to *let out a little bit*," surely by the time one wire has been let out a little bit, pulled in a little bit and the vibrations counted several times a whole section of conductors could have been sagged by the sighting board method.

In these days of keen price competition I cannot see Dr. McCombe's method being widely adopted, and in conclusion must express my surprise that he advocates binding in uplift conductors on to pin insulators. Surely this is bad practice and does not go hand in hand with such modern methods of sagging. W. A. RUSHTON.

Rhostyllen, near Wrexham, *November 29th.*



High-voltage transmission in the Far North. This photograph sent us by Lt.-Comm. Douglas Dixon (an Old Faradian) shows a 132-kV single-phase line between Lulla in the Bothnian Bay and Riksgransen on the Norwegian border and thence to Narvik where the power is used primarily at the Lapland iron mines

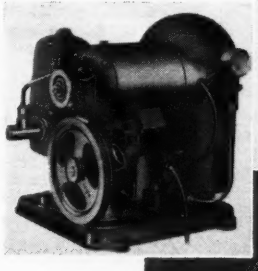
New Electrical Products

A review of equipment recently marketed

Pressure-operated Domestic Pump

A PRESSURE-OPERATED domestic pumping set recently introduced by R. A. LISTER & CO., LTD., Dursley, Glos., has as its basis an electrically driven pump, arranged for hand or float switch control. One feature of the plant is that it does away with the necessity for an overhead storage tank and consequently removes a considerable item from the initial outlay on a new water supply system.

The pump, which is illustrated below, draws water in the ordinary way with a practical 25 ft. lift; this water is delivered to a cast iron chamber containing a certain quantity of air under a pressure of 20-40 lb. per sq. in. A switch is incorporated, which starts and stops the pump motor according to the fall and rise of the air pressure in this chamber, the outlet of which is connected directly to the supply main. Hence, when a tap or ball cock at the end of the delivery line is opened, water is forced out by the air compressed in the pump chamber; this air expands correspondingly while the pressure drops sufficiently for the automatic switch to bring the pump into action and maintain the flow up to 250 gals. an hour. When the tap is closed, water is forced back into the chamber, compressing the air to its original state, and the switch stops the plant automatically



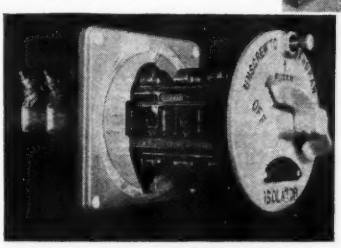
The Lister pressure pump

To overcome possible variations in the performance of the pump through absorption of air from the vessel by water passing through the pump, automatic compensation has been arranged. The set is useful in cases in which it is difficult to install a storage tank in the roof, as the plant may be housed at any convenient spot at ground level and still give ample delivery pressure.

The ¼-HP motor is British made, and can be supplied for 32-250 V DC, or 100-120 and 200-250 V AC single phase.

An Isolating Fuse

The "Isofuse" is the name given by BROOKHIRST SWITCHGEAR, LTD., Chester, to a new quick-make-and-break switch embodying re-wireable fuse elements and designed for building in.



The Brookhirst "Isofuse"

It comprises two parts, each mounted on complementary die-cast metal plates, one supporting the fixed contacts and the other the fuse carrier and moving contacts. The moving contact portion can be removed to give safe access to the fuses by merely loosening one non-removable screw. Thus it is impossible to withdraw the fuse-carrier with the switch "on," to make contact inadvertently between the fixed and moving metal parts during withdrawal or to replace the moving contact portion incorrectly.

The fuse elements are contained in a specially designed porcelain carrier and are connected between the moving contacts. Access to the elements is obtained by removing two screws which fix the porcelain cap. Each element has a separate fusing chamber and gas vent, the fusing being damped by asbestos pads. When the fuse blows, the cooled gases are thrown clear of the contacts, of the butt type and spring-loaded.

The switch is suitable for up to 15 A at 440 V or 30 A at 220 V. In respect of breaking capacity the "Isofuse" complies with B.S.S.88 (440, A.C.1), having successfully cleared a prospective short-circuit of 1,000 A and 0.3 p.f. 440 V six times in succession.

Utility Handlamp

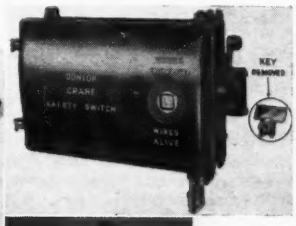
A battery handlamp for use in garages, warehouses stores, &c., and air-raid shelters has just been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. The lamp is housed in an all-metal case and comprises a strong steel frame with carrying handle, a solid front to which is attached a substantial "on" and "off" switch, reflector and lens. The battery is of a high capacity three-cell type, giving approximately 80-100 hours' light (intermittent). The overall size is 8 in. by 5 in. by 4¾ in., and the weight is 5 lb. 11 oz. A 4-V, 3-A flashlight bulb is used.

Trolley Wire Safety Switches

To comply with the latest recommendations of the Home Office for the protection of men having to carry out work on or near bare wire conductors, a special "Donlock" trolley wire safety switch has been introduced by the DONOVAN ELECTRICAL CO., LTD., Stechford, Birmingham, 9.

The switch has two operating positions only. In the down position of the handle the trolley wires are alive, and in the up position the section of trolley wires protected is connected to earth. The lid of the switchbox is secured by means of a padlock and the key need never be used except when access to the switch is required for connecting up, &c. In the lid there is fitted a figure lock, the key of which is normally trapped within the lock when the switch handle is in the "trolley wires alive" position.

When work on the trolley wires is to be undertaken the switch handle is first moved to the "trolley wires earthed" position, when it is possible to turn the key in the lock and then remove the key. When this is done the switch is locked in the "trolley wires earthed" position and must stay so until this particular key is brought back by the operator, since these are figure locks and only one key is provided for each lock.



A "Donlock" trolley wire safety switch

The switch is available in all sizes up to 400 A double and triple pole, 650 V maximum.

Sub-standard Meters

A rotating sub-standard watthour meter complying with the specification laid down in the memorandum of approved testing apparatus issued by the Electricity Commissioners is announced by FERRANTI, LTD., Hollinwood, Lancs. This portable type PFR meter is available only as a single-phase two-wire unit and is usually rated at 5 A, with a precision current transformer to provide as many current ranges as are required. Up to three ranges of voltage are obtainable by means of a variable impedance in series with the pressure coil of the meter.

The Ferranti single-phase sub-standard meter

The element used is of new design with limits of error and performance in conformity with the specification mentioned above and with B.S.S. No. 37/1937 for precision grade meters. A horizontal register is provided for carrying out revolution tests; it comprises a large pointer mounted on an extension of the rotor spindle, together with two small inset pointers to read up to 99.99 revolutions. By means of a knob at the side of the dial all three pointers can be instantaneously reset to zero. To enable long-period dial tests to be made an entirely separate register consisting of a six-dial pointer type train reading in kWh is mounted in a vertical position. A switch is provided for the interruption of the potential circuit to stop and start the meter. The case is solidly constructed from polished walnut and all fittings are chromium plated. Each dial is covered by a lid when not in use. For DC the Type PDC meter is available.

An Integrating Regulator

An integrating regulator has been designed by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17, for the automatic control of load, voltage, speed, or any other quantity that can be regulated by means of electrical impulses applied through the agency of a servo-motor or similar adjusting device.

An important feature of the design is that the length of each regulating impulse is precisely proportional to the error to be corrected, the average deviation from a set value being measured continuously during periods of any selected length. Consequently the regulator can be used when there are rapid and continuous fluctuations in the value of the controlled quantity, such as might lead, in the case of a regulator actuated by instantaneous values, to heavy and unnecessary wear on the mechanism, and to unsatisfactory performance arising from the inability of the regulated machine to follow closely the rapid adjustments.

The new regulator embodies a timing element and a measuring element, each controlling one of the two-way switches in a "corridor" circuit that includes the servo-motor. The corridor switch is opened and closed at a constant frequency by the timing element, and a second switch is similarly controlled by the measuring element at a frequency proportional to the regulated quantity. So long as the regulated quantity is constant at the set value, the two switches operate in synchronism, but in an exactly opposite sense; consequently no current can

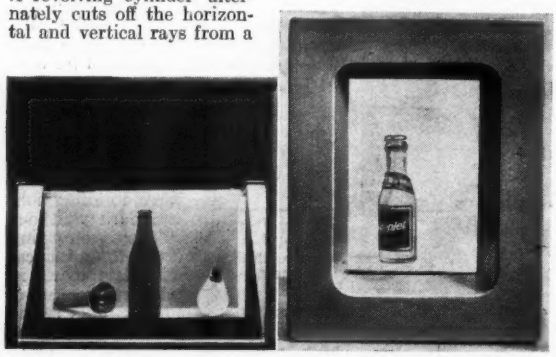
flow through the corridor circuit. If, however, the regulated quantity deviates from the set value, the corridor circuit is completed for a part of each cycle. This causes a pair of normally open contacts to close the servo-motor circuit and thus initiate the correcting operation. At the same time, the rotation of one of the elements is arrested for the brief time necessary to restore synchronism between them. In this way "hunting" is prevented. Where the timing element is a clock of either the synchronous electric or the pendulum pattern, synchronism can be restored by stopping the measuring element or doubling its speed during the period of the correcting impulse.

The scope of the integrating regulator is wide. A good example is its application in a generating station that supplements from an outside source the power generated by the station plant, it being desired to maintain the imported load at a constant value. So long as the imported load is constant at the set value, the corridor switches on the regulator are opened and closed in synchronism and no correcting impulse is initiated. If the load rises, the speed of the load measuring element increases, and the associated corridor switch operates correspondingly earlier, thus initiating a "raising" impulse to the servo-motor. If the load falls below the set value, a "lowering" impulse is transmitted to the servo-motor, and the rotation of the timing element is momentarily arrested or synchronism is restored in some other way.

Electrical Advertising Devices

Several fascinating new electrical devices for advertising purposes have just been placed on the market by the DOMINION ELECTRICAL CO., 160, New Cavendish Street, London, W.1.

Perhaps the most striking is a "transformation cabinet." A revolving cylinder alternately cuts off the horizontal and vertical rays from a concealed lamp; this, in conjunction with a system of mirrors, can be employed to produce the effect of articles disappearing, being substituted for others or even "X-rayed." A lamp and a carton can, for example, be arranged so that one is seen by direct and the other by indirect vision, the viewer receiving the impression of the lamp gradually being seen through the carton until finally the latter disappears altogether. A standard unit 16 in. cube is available, but cabinets of any size can be made to suit special requirements.



The Dominion Electrical Co.'s transformation cabinet and the "Mystic" sign. In the transformation cabinet illustrated the torch, bottle and lamp appear to change into a battery, glass of beer and lamp carton

Articles are made to appear to float in air by another device called the "mystic" sign. They are stuck on to a sheet of glass which is swung pendulum-like by means of a small solenoid operated from a 4½-V dry battery. A new range of moving displays is also available.

Fog Lamps

The introduction of a new non-glare fog and traffic lamp, slightly smaller and cheaper than its standard unit, is announced by NOTEK, LTD., who have just moved to new premises in 230-4, Brixton Road, S.W.9.

Explaining the operation of the lamp, Mr. C. Casper, managing director of the company, told us that fog is never so thick immediately above the road surface and accordingly the lamp has been designed to project a sharply defined laminated flat-topped beam of light actually beneath the fog blanket. Under normal conditions dipping is unnecessary.

A triple reflector gives three widely separated and distinct beams which are blended by means of a special lens into a single composite beam. This brilliantly illuminates the road immediately in front of the car, broadening to a width of nearly 100 ft. and extending, in clear weather, well over 500 ft. ahead. The amber coloured lens, we were told, makes rain and falling snow invisible, while the rays are not absorbed by shining and dark road surfaces. The lamps are British-made throughout.

A Domestic Iron

BROWN BROS., LTD., Great Eastern Street, London, E.C.2, have recently put on the market a new domestic iron at a low price. It is of sturdy construction and has an overall length of 7½ in. The iron, which is nickel plated, has a chamfered sole plate and thumb rest, and is supplied complete with two yards of two-core flex terminating in a bayonet-cap adaptor. Voltage ranges are 200/220 and 230/250, and the loading is 350 W.

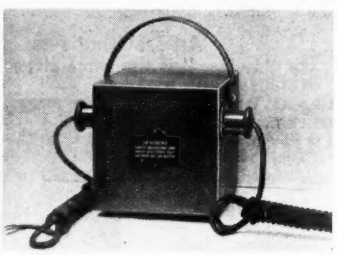
The new "Duco" iron in use

Refrigerator Strainers and Driers

In the operation of refrigeration plant the removal of solid matter and of moisture from the liquid refrigerant is essential. The BRITISH THERMOSTAT CO., LTD., Windmill Rd., Sunbury-on-Thames has just introduced a new range of strainers and driers, known as the "DN" type. They are of substantially larger capacity than the previous "S" type and are at the same time lower in price.

Safety Lamp Transformer

A small transformer for hand-lamps has been introduced lately by F. C. HEAYBERD & CO., 10, Finsbury Street, London, E.C.2. It is constructed inside a robust mahogany finished case and steps the voltage down from 200/250 V, 40/100 cycles to 12 V, so that a 12-V 36-W motor car lamp can be used.



The Heayberd safety transformer

The outfit is particularly suitable for use in garages, and the hand-lamp itself has an insulated handle and a strong metal protective cover. The weight is 7 lb. and the outfit is sold with two non-reversible connectors.

Domestic Washer for Confined Spaces

So limited is the space in many kitchenettes that it is often difficult to accommodate even the smallest model of the conventional types of electric clothes washers. To meet such cases the HURLEY MACHINE CO. (ENGLAND), LTD., 55, Oxford Street, London, W.1, has added a new model to its present "Thor" range. It is known as the "Stow-a-Way," and is small enough to slide under the sink or kitchen table, needing a space only 23⅜ in. high by 21⅛ in. wide by 22⅜ in. deep for storage.

The lacquered sheet steel cabinet is square, has a flat top and is mounted on rubber-wheel castors. The legs are retractable, operated by a crank, to raise the machine to a convenient working height, so that the wringer will drain into a sink if desired. The 9-gal. tub will deal with 35 lb. of clothes per hour, the six-vane agitator being controlled by a start-stop handle at the side of the cabinet. The mechanism is entirely concealed, having a twin belt drive from a 1/6 HP motor, which also drives the draining pump for discharging the water into the sink through a swinging stand-pipe, the height of which is adjustable; there is an auxiliary gravity drain. The wringer is made of cast aluminium, polished all over (no enamel or lacquer) and is detachable for storage in a cupboard in the base of the washer cabinet. It is interchangeable with a 1,200-W roll ironer, which is provided with a carrying handle that also serves as a support for vertical storage when not in use.

The new "Thor" washer in both low and extended position for ironing and wringing

Conditions in Canada

Increased electrical trade

IN view of the Anglo-American and the Canadian-American trade agreements which were signed at Washington recently, the report of Mr. A. R. Bruce (Assistant to H.M. Senior Trade Commissioner in Canada and Newfoundland), on economic and commercial conditions in Canada (Stationery Office, 2s. 6d. net), is of more than usual interest.

Mr. Bruce states that the year 1937 was for Canada a period of great industrial and commercial activity, although there was a decline in December due largely to the recession in business in the United States. One of the principal causes of prosperity was undoubtedly the flourishing export trade, the volume of which was nearly equal to that in 1929 and the value double that in 1932; this in spite of the fact that the 1937 wheat crop was the smallest since 1914 and but slightly more than half the long-term average. Despite the reduction in wheat exports, the value of the total export trade in 1937 rose by 8.4 per cent. The increase in the import trade was 27.4 per cent.

The newsprint, mining and power industries had contributed very much to the period of prosperity which reached its peak in 1929, but in 1937 they attained new heights. In the manufacturing field, 1937 was an exceptionally prosperous year and the volume of production was even greater than in 1929. There was a pronounced improvement in the heavy industries and the production of pig-iron and steel in the first ten months of the year exceeded the totals for the entire previous year. An examination of the manufacturing position of the Dominion in the past few years shows not only a steady increase in the value of output, but also a marked expansion in the variety of products made. In many cases the volume of production is sufficient to meet a large part of the requirements of the domestic market and also to leave a margin for exports. Some information on the output of metals appeared in our issue of November 18th (p. 716)).

Manufacturing Industries

The gross value of the products of the manufacturing industries in 1936 was just over $3,000 million. These industries are concentrated largely in the provinces of Ontario and Quebec, although the Western Provinces are beginning to assume increasing importance. A prominent feature of Canadian manufacturing development in recent years has been the growth of non-ferrous metal smelting and refining, which displaced the pulp and paper industry in 1935 as the most important manufacturing industry. The incidence of the depression resulted in a rearrangement in the rank of many industries. The decreased expenditure for capital goods greatly reduced the output of such important industries as electrical equipment, primary iron and steel, machinery, &c. In 1937, manufacturing operations gathered momentum and the output was slightly greater than in 1929; the gain over 1936 of 8.5 per cent., indicates the extensive nature of the recovery.

Production by concerns in the electrical apparatus and supplies industry was valued at $72.2 millions in 1936, as compared with $61.1 millions in 1935. There were 185 plants in operation in 1936, 134 of which were in Ontario and 29 in Quebec. These concerns represented a capital of nearly $80 millions and afforded work to 17,037 employés. The following table shows some of the principal products in 1936 :—

	Gross selling value at works
	$
Wireless sets and parts (except tubes and transformers)	11,909,260
Wires and cables (except aluminium)	10,127,987
Batteries and parts	5,928,956
Electric refrigerators	5,463,471
Motors, AC and DC, and parts	4,383,438
Incandescent lamps (standard size)	4,117,871
Telephone material	2,979,534
Transformers and parts	2,983,156
Motor-driven appliances (vacuum cleaners, fans, washing machines clocks, etc.)	2,530,124
Lighting fittings	1,754,825
Wireless receiving valves	1,545,823
Conduit and fittings	1,044,708
Switchboard panels and equipment	1,001,344

Canadian exports of electrical apparatus totalled $4,309,975 in 1937, as compared with $3,455,812 in 1936. Exports to the United Kingdom in 1937 were valued at $1,024,041. The number of electric cookers exported last year was 22,256, valued at $1,503,146. The largest market was South Africa, which imported 14,733 cookers valued at $925,680. Exports of cookers to the United Kingdom totalled $150,233.

Water Power Development

The present turbine installation represents less than 19 per cent. of the water power resources of Canada. Approximately 60 per cent. of the total available water resources and more than 81 per cent. of the developed water power, are situated in the industralised provinces of Ontario and Quebec in which there are no known natural coal deposits. Since the introduction of the long-distance transmission of electricity in the last decade of the nineteenth century, Canada's central station industry has expanded until at the beginning of 1938, 7,074,641 HP, or 87.2 per cent., of the total hydraulic development was installed for the development of electricity for distribution to the public. More than 27,000 million kWh was generated during 1937 by hydraulic power and the investment in hydro-electric stations and their distribution systems at the end of 1936, the latest year for which figures are available, exceeded $1,435 millions. These figures represent more than 98 per cent. of the electrical output and almost 97 per cent. of the total capital investment of all central stations in Canada. The output in the first four months of 1938 was 8,660 million kWh, as compared with 9,200 million kWh in the corresponding period of 1937. Only small additions were made to the plants in 1936, which permitted the demand for power to approximate to installed capacity, and has resulted in a resumption of further installation in existing plants and in the inauguration of new construction programmes.

Electrical Import Trade

Imports of electrical apparatus into Canada totalled $15¼ millions for the year ended March, 1938, as compared with nearly $12 millions in the previous year. The United States has the bulk of this trade and, in the year ended March last, imports from across the border were valued at $12.4 millions, as compared with $10.3 millions for 1936-37. Imports from the United Kingdom in the same years increased from $1.2 millions to $2.1 millions. Some of the principal imports in this group in the fiscal years ended March, 1937 and 1938, and the shares of the trade obtained by the United Kingdom and the United States are as follows :—

	(In thousands of dollars).					
	Total Imports.		Imports from U.K.		Imports from U.S.A.	
	1936-7.	1937-8.	1936-7.	1937-8.	1936-7.	1937-8.
Storage batteries	152	160	95	100	56	59
Dynamos, generators	544	769	157	186	348	491
Lighting fittings	664	799	12	26	622	715
Lamps	252	268	37	9	153	121
Motors	1,650	2,398	243	463	1,353	1,899
Switches, etc.	656	916	67	115	574	663
Telephones	736	1,019	46	77	689	941
Transformers	142	422	24	206	110	99
Wireless apparatus, n.o.p.	2,514	2,486	131	190	2,381	2,294

The market is a difficult one for United Kingdom manufacturers, partly because of the large productive capacity of the local manufacturers and partly because standard equipment is similar to that used in the United States. Moreover, some of the largest Canadian manufacturers and purchasers of electrical apparatus are associated with parent companies in the United States.

Mr. Bruce says that in the case of equipment such as dynamos, generators, transformers, motors, switches, &c., it is essential that United Kingdom manufacturers should have organisations in Canada capable of servicing equipment of this type. Considerable harm to United Kingdom trade in these lines has been caused owing to the taking by United Kingdom firms of a few orders when representatives have visited Canada or owing to the appointment of a selling agent only, with subsequent failure to give adequate service. It is advisable that those interested in the Canadian market should be fully conversant with the special conditions prevailing before attempting to do business.

Motor Starters

THE B.S.S. 587 for motor starters and controllers was first published in 1935 and eliminated ten separate standards, each of which dealt with a different type of control gear by bringing them all under one cover. Later there were introduced a number of modifications, and now a new edition has been published as B.S.S. 587-1938. An important feature is the specific reference in the scope clause to resistors supplied as separate units, removing ambiguity and making it clear that they are covered. Furthermore, a special appendix has been added to facilitate reference to the various clauses relating respectively to starters, controllers, resistors, and auto-transformers. Copies may be had from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

New Books

Wireless Direction Finding. By R. KEEN. Third edition. (Pp. 803; figs. 549.) London: Iliffe & Sons Ltd. 25s. net.

AMONG the many spheres in which wireless communication has proved of direct benefit to mankind not the least important has been the application of radio direction finding methods as an aid to navigation. This justifies a comprehensive textbook on the subject such as the admirable work under review. So far as we are aware, Mr. Keen's is the only book describing in a comprehensive manner the principles and practice of modern wireless direction finding.

The treatment of the subject is essentially descriptive and the mathematics has been reduced to the minimum. At the same time a sufficient analysis is given of the different types of directive aerial systems and of the propagation of radio waves to enable the various phenomena encountered in wireless direction finding to be clearly understood. Full and clear descriptions are given of the various types of commercial and experimental apparatus used in direction finding for installation on land, in ships or in aircraft. The salient features of the various bands of wave-lengths are dealt with, and special chapters are allocated to short-wave direction finding and to the beacon systems now coming into use for guiding aircraft and for facilitating landing under conditions of poor visibility.

The practical bias given to the book is well illustrated by the chapters on maps and on field and nautical astronomy; these should be of great service to the installation engineer, operator and navigator. At the same time, the advanced engineer and research student will welcome the chapter surveying various systems, including the cathode-ray direction finder, which have nearly, but not quite yet, come into the field of practical operation. A bibliography of some 570 references neatly set out completes an excellent cyclopædia on the subject.—R. L. S.-R.

The J. & P. Switchgear Book. By R. T. LYTHALL (Pp. 431; figs. 315.) London: Johnson & Phillips, Ltd. Price 10s. 6d.

This is the third edition of a handbook that in a more modest form had achieved a high position among works of its kind. It has now been entirely re-written and nearly trebled in size, making a worthy stable companion to the "J. & P. Transformer Book." As an indication of the expansion of the range, the index now occupies twelve pages instead of two. Intended as an outline of modern switchgear practice for non-specialist users, this work can be thoroughly recommended to all in any way concerned with the selection, ordering, operation, and maintenance of power switchgear, other than the very heavy types used in grid sub-stations and the largest capital stations, with which it does not profess to deal. Perhaps the most important section is that relating to low-voltage switchgear, in view of the need to deal with increasing fault kVA on distributing systems with safety and without large expenditure. In addition to providing data on circuit-breaker design (air- and oil-break) fuses, short-circuit testing and calculations, the scope of the work covers protective gear and instruments, neutral earthing, bus-bar systems of connection, current-limiting reactors, and information required in tendering and ordering. An appendix of twenty-seven pages deals with the use of symmetrical components in connection with single-phase faults. A bibliography of recent literature of the subject is also included, and references are made throughout the text to the appropriate B.S. Specifications. The treatment is not confined to the products of a single firm, the specialities of several manufacturers being described.—C. O. B.

The Economic Principles of Electrical Distribution. By H. M. SAYERS. (Pp. 169.) London: Sir Isaac Pitman & Sons, Ltd. Price 12s. 6d.

Fourteen years ago Mr. Sayers wrote a short book on "Electricity Costs and Charges," the costs in question being largely generation costs. It is a recognition of the altered centre of gravity of the supply industry that instead of attempting to rewrite this book he has written a sequel on distribution costs. Nowadays supply undertakings start where their predecessors left off, and for many of them the transfer of energy at a given price is the beginning of their transactions rather than its termination. Instead of buying coal and selling energy, they buy energy (in bulk) and sell electrical service. This book is, therefore, addressed to all whose business it is to retail electricity to the final consumer, and there are few of them who will not find it of value.

The economic choice of distribution plant is first dealt with, including cables and lines, and (to a minor extent) transformers. Some discussion of the cost of transformer losses would have been useful here, including advice on the most economical proportion of losses for a given duty. The statement that "Fortunately the modern transformer has only losses of the order of 2 per cent. of the input" is a somewhat complacent glossing over that fact that this little 2 per cent. will probably cost the unfortunate user two or three times as much as the transformer itself. Kelvin's Law is dealt with in detail on the basis of the "cost per ton of cable" by which is meant the elements of cost proportional to cross-section.

The important question of losses load factor is treated at considerable length here and in a later chapter, where it is suggested that the correct yearly value of the losses can be obtained by plotting the 365 daily load curves on polar paper and finding their areas. This is quite true but is it practicable? The labour involved is enormous, and the resulting accuracy goes far beyond what is required, at least for economic choice calculations. Moreover it cannot be applied to a projected scheme for a load not yet in existence. Fortunately there are empirical expressions which give an approximate result with great ease, but the author does not refer to them. Possibly it is the bibliography that is at fault. (The only reference here is dated 1897, and much has happened, even to Kelvin's Law, since then.) An excellent summary of existing data on loss load factors was given by Mr. W. F. Cooper in the chairman's address to the Sheffield Sub-Section of the I.E.E. (October, 1937), and a future edition might take cognisance of this.

The author points out a further difficulty in applying Kelvin's Law, namely that the average price of the loss energy is higher than the average price of the total load. This difficulty can, however, be precisely overcome by expressing the cost in a two-part form. Subsequent chapters deal with distribution systems and the economic choice of voltage. These are followed by an interesting but rather brief attempt at a detail design based upon load forecasts. Two final chapters cover tariffs and a summary. Here, again, the treatment is too brief and too generalised, and omits any reference to tariff construction.

But whatever its shortcomings the book is a significant tribute to the importance of distribution costs, and a welcome addition to the meagre literature dealing with the economics of electrical practice.—D. J. B.

Shorter Notices

THE first edition of an international electrotechnical vocabulary has now been published by the International Electrotechnical Commission. About two thousand technical terms are defined in both English and French, and the terms themselves are also translated into German, Italian, Spanish and Esperanto. The terms are grouped under fourteen headings. English purchasers may obtain copies of the vocabulary from the British Standards Institution, Publications Department, 28, Victoria Street, S.W.1, price 10s. 6d. post free.

"Background to Modern Science." Edited by Joseph Needham and Walter Pagel (243 pp.). London: Cambridge University Press. Price 7s. 6d. net.—This is a series of ten lectures arranged by the Cambridge History of Science Committee given by leading authorities in their subjects which include physics by the late Lord Rutherford, crystal physics by Prof. W. L. Bragg and atomic theory by Mr. F. W. Aston. The lectures formed an initial course in the history of science. There have since been other series of a similar nature all of which have been enthusiastically attended.

The twenty-seventh edition of the well-known standard work on motor-cycle maintenance, "Motor Cycles and How to Manage Them" (pp. 275; figs. 143), Iliffe & Sons Ltd., price 2s. 6d., has just been issued. It has been revised throughout and brought up to date and the contents are of a very practical nature.

"Fundamentals of Electricity and Magnetism," by L. B. Loeb. (Pp. 554; figs. 224). Price: 20s. "Atomic Structure," by L. B. Loeb. (Pp. 446; figs. 109). Price: 22s. 6d. "Testing Television Sets," by J. H. Reyner. (Pp. 129; figs. 48.) Price: 9s. 6d. "Commissioning of Electrical Plant," by R. C. H. Richardson. (Pp. 363; figs. 200). Price: 21s. "Amplification and Distribution of Sound." By A. E. Greenlees. (Pp. 254; illus.). Price 10s. 6d. London: Chapman & Hall.

"Principles of Electricity and Magnetism," by G. P. Harnwell. (Pp. 619; illus.) Price: 30s. "Physics for Technical Students" (Sound, Electricity, Magnetism and Light), by W. B. Anderson. (Pp. 796; figs. 534). Price: 15s.

"Practical Mechanics Handbook" (Pp. 400; figs. 379). by F. J. Camm. Price: 6s. "Workshop Calculations, Tables and Formulae," by F. J. Camm. (Pp. 144; figs. 120.) Price: 3s. 6d. London: George Newnes, Ltd.

"Switchgear Handbook," Vol. I, by W. A. Coates and H. Pearce. (Pp. 190; figs. 106.) Price: 16s. "Processes and Machinery in the Plastics Industry," by K. Brandenburger. (Pp. 243; figs. 164.) Price: 25s. "Electric Circuits and Wave Filters," by A. T. Stair. (Pp. 476; figs. 402.) Price: 21s. London: Sir Isaac Pitman & Sons, Ltd.

"Accumulator Charging, Maintenance and Repair," by W. S. Ibbetson. (Pp. 165; figs. 42.) Price: 4s. 6d.

"Winding Alternating Current Motor Coils," by G. A. Van Brunt and A. C. Roe. (Pp. 280; figs. 270). "Electrical Machinery," by F. A. Annett. (Pp. 428; figs. 494.) Price: 18s. each. London: McGraw Hill Publishing Co., Ltd.

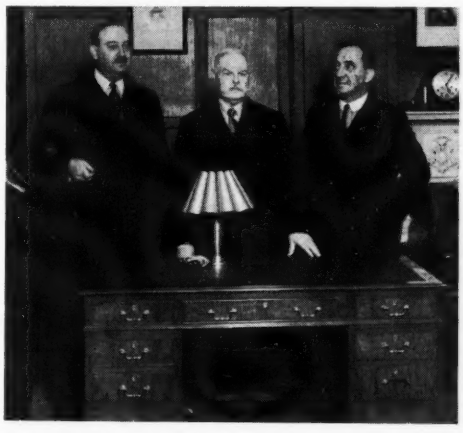
"Electrical Engineering." Vol. I, by W. Tolmé MacCall. (Pp. 550; illus.) Price: 15s. London: University Tutorial Press.

"Photoelements and their Application," by Dr. Bruno Lange.—We have been asked by Messrs. Chapman & Hall, Ltd., London, to state that they are the agents for this book throughout the British Empire.

Personal and Social

Information regarding new appointments and other matters of interest for this page are welcomed

ABOUT 250 directors, members of staff, employés and guests of the City of London Electric Lighting Co., Ltd., gathered at the Café Royal, Regent Street, last Friday to do honour to the company's chairman, **Mr. Philip Debell Tuckett,** who has just completed forty years as a director of the company. Mr. A. E. Hadley, C.B.E., deputy chairman, presided, and after the loyal toast, proposed the health of the guest of honour. In an amusing speech he detailed Mr. Tuckett's many accomplishments, mentioning, *inter alia*, that he rowed in the Oxford crew of 1890. He said that Mr. Tuckett was one of a band of leaders who foresaw the great future of electricity; he had studied the consumers first, then the staff and the shareholders, and last of all his own convenience. He had been connected with many other leading electricity supply companies, including Edmundsons and the Urban Co. Mr. Hadley concluded by saying that he would send a message of greeting from the assembly to Mrs. Tuckett and their two daughters. The toast was supported by Mr. C. F. McLeay, on behalf of the employés of the company, and Mr. Tuckett replied with some interesting reminiscences. In a felicitous proposed the health of the visitors, speech Mr. H. J. Randall, manager, mentioning particularly representatives of the City Corporation, other London supply companies, the Central Board and the Electricity Commissioners. The toast was responded to by Alderman Sir George Wilkinson and Mr. E. S. Herbert. An excellent cabaret entertainment followed the dinner and concluded a very enjoyable evening.



The presentation to Mr. A. T. Brotherton, showing Mr. T. B. Keep, managing director of the Brush Co. (left) and Mr. H. E. Midgley, sales director

Sir Richard Gregory, who has been associated with *Nature* for forty-five years, has retired from the editorship of that journal.

Mr. R. V. Powditch, Grad.I.E.E., has relinquished his position in the electric motor department of Delco-Remy & Hyatt, Ltd., as assistant to the sales manager, and has taken up an appointment as sales engineer in the small motor department of Crompton Parkinson, Ltd., at the company's London office. Mr. Powditch served his apprenticeship with Clarke, Chapman & Co., Ltd., and received his technical training at Rutherford College, Newcastle-on-Tyne. Before joining the Delco-Remy Co. he was sales engineer with Power Contracts (Batwin), Ltd.

Mr. A. de Turckheim, who has been secretary of the Tramways, Light Railways and Transport Association since 1906, has tendered his resignation, and this has been accepted by the Council, to take effect as from December 31st. Earlier this year he retired from the secretaryship of the Incorporated Association of Electric Power Companies. **Mr. E. D. Croft,** who has been selected by the committee of the Tramways and Light Railways Association to succeed Mr. de Turckheim, was educated at Exeter School and St. John's College, Cambridge, and holds the degrees of M.A. (Cantab.) and B.Sc. (London University), both in natural science. On leaving Cambridge he took a course in business administration in Harrods, Ltd., and in 1930 joined the Roads Improvement Association to carry out secretarial and publicity work. In 1931 he joined the editorial staff of the *Manchester Guardian Commercial*, and for the past four years has been technical editor of that journal. He has written extensively on technical matters and has broadcast many talks on scientific and technical topics. The resignation of Mr. de Turckheim carried with it the termination of the sub-tenancy of the present offices of the Association, and Rooms 307-308, Abbey House, Victoria Street, Westminster, S.W.1, will be taken over as the new offices of the Association.

Mr. E. D. Croft

Mr. J. Ward, junior mains assistant with the Bingley U.D.C., Electricity Department, who is leaving to take up a similar appointment with the Whitehaven Corporation, has been presented, on behalf of the staff, with an electric clock and a fountain pen by Mr. O. G. Cook, chief engineer and manager.

Mr. E. J. Sutton, A.M.I.E.E., formerly of J. Stinton Jones & Partners, has joined the staff of the Bective Electrical Co., Ltd., as chief engineer.

Mr. A. T. Brotherton, J.P., who has resigned his directorship of the Brush Electrical Engineering Co., Ltd., was presented with a walnut writing desk and reading lamp on November 22nd. Mr. H. E. Midgley, M.A.(Cantab.), M.Inst.C.E., M.I.Mech.E., M.I.E.E., sales director, who made the presentation on behalf of the executives, staff and employés, paid tribute to the fifty-four years of service rendered by Mr. Brotherton to the Brush Company, and in the course of his speech said that after his apprenticeship Mr. Brotherton was appointed assistant to the works manager and ultimately assumed the task of rolling stock estimating. When the Loughborough works were acquired in 1894 Mr. Brotherton took over works estimating. He was given a seat on the board in 1930 and it was only by reason of the readjustment and reorganisation of the company's works and finance that he resigned his directorship this year. Mr. Brotherton had also a long and active association with labour matters, being representative of the Employers' Federation and was co-opted on the York Conference Committee. Mr. H. Pearce, one of the company's oldest employés, supported Mr. Midgley and mentioned that Mr. Brotherton had always worked in harmony with the staff. Mr. Brotherton suitably responded, and Mr. T. B. Keep, M.I.Mech.E., M.Inst.T., managing director, also spoke.

The first annual dance of Aberdare Cables' Sports Club was held in Aberdare on November 17th, when approximately 400 employés, staff and friends were present. During the evening **Mr. Elder,** the works manager, read a message from Mr. Usher, the chairman, saying that he regretted he could not be present as he was sailing that day for South Africa on business. Mrs. Elder distributed the spot prizes.

Mr. R. Goode has joined A. J. Coleman & Co., Ltd., electrical and radio wholesale factors, of Northampton, as an extra representative. His principal duty will be to call on electrical dealers.

On November 18th the Electrical Trades' Commercial Travellers' Association held its annual dinner and dance at the Criterion Restaurant, London, about 250 attending, including the president, Mr. P. V. Hunter. The chairman of the Association, Mr. B. Windle, was prevented by ill-health from being present, and his place was taken by the vice-chairman, **Mr. P. Wheatland.** Mrs. Windle was present and reported that Mr. Windle was making satisfactory progress. The toast of "The Ladies" was given by the acting chairman, and Mrs. P. S. Jessel, daughter of the president, made a brief reply, There was dancing until midnight, with Mr. C. F. Tapster as an able M.C.

Mr. H. M. Georgeson, A.M.I.E.E., A.M.C.T., sails on December 16th in the *Edinburgh Castle* for South Africa, where he will co-ordinate the business of Laurence, Scott & Electromotors, Ltd., in that country. Mr. Georgeson received his training with the Metropolitan-Vickers Electrical Co., Ltd., at its Trafford Park works and subsequently was engaged on its Manchester city office engineering sales. Since leaving Met-Vick he has served with the General Electric Co., Ltd., both at home and overseas, and prior to joining L.S.E. he was assistant to the export manager of the Lancashire Dynamo and Crypto Co., Ltd., London.

Mr. H. M. Georgeson

Mr. C. S. B. Slight, sales engineer to the Eastbourne Corporation Electricity Department, has been appointed sales and installation superintendent to the Guildford Corporation Electricity Department. Before going to Eastbourne Mr. Slight was with the Nottingham Corporation electricity undertaking.

The annual dinner of Standard Switchgear, Ltd., was held at the White Hart, Brentwood, on November 25th, when **Mr. A. G. Collis,** governing director, in reply to the toast of "The Firm," proposed by Mr. Brackpool, works superintendent, said that the company employed 200 people and the output last year was nearly three times greater than in the previous year. There had been an insistent demand for their engineering

designs, and they proposed to extend these productions. The production of the meter which they had developed was being removed from the Hornchurch works to make way for other designs of switchgear, which was the fundamental part of their business.

The dinner of the Scottish Centre of the Institution of Electrical Engineers was held at Glasgow on November 22nd, **Mr. W. J. Cooper,** chairman of the Scottish Centre, presiding. Mr. P. M. Ritchie, president of the West of Scotland Iron and Steel Institute, proposed the toast of "The Institution of Electrical Engineers" and in reply Dr. A. P. M. Fleming, president of the Institution, said that to ensure the benefits that could come from engineering enterprise, public opinion and public conscience needed awakening. They would like to see things beautiful in their cities—beautiful homes, beautiful streets, beautiful illumination, but only engineers could accomplish such things. Before they could achieve this beauty they must have public opinion aroused and developed to such an extent that the public would clamour for the things they should have and were at present denied. He believed that much could be done towards this object by enlisting the support of women, who fully realised the benefits of electrical engineering and scientific research. In conclusion, he remarked that Glasgow could be regarded as the cradle of electrical engineering, because electrical engineers depended upon the steam prime mover for their sources of electrical power. "The Chairman" was proposed by Major H. Bell, past chairman of the Scottish Centre.

The close connection between the Post Office and the electrical industry was stressed by **Sir Walter J. Womersley,** M.P., Assistant Postmaster-General, at the annual dinner of the South Midland Centre of the I.E.E. at the Grand Hotel, Birmingham, last Friday. Referring to Mr. Walter Higgs, M.P., he said it would be a good thing to have more business men in the House of Commons. Many Post Office engineers were closely associated with the Institution of Electrical Engineers, for which the Post Office had provided several presidents. The chairman of the South Midland Centre, Mr. H. Faulkner, had also performed valuable services to the Post Office, especially in connection with the development of the coaxial cable. The electrical industry was among the youngest industries, but it now ranked fifth and was growing rapidly. In ten years the number of consumers had increased threefold and "units" sold 2½ times. The I.E.E. had played a great part in this development in dealing with technical problems, in training men to be leaders, and in setting a high standard of workmanship. Further development in the application of electricity was still to come. Responding to the toast of the Institution proposed by Sir Walter, Dr. A. P. M. Fleming, President of the I.E.E., said that an increasing demand for power must be expected and that the only set-back he could see would come from dwindling population. Mr. H. Faulkner, in proposing the toast of the City of Birmingham, stated that it possessed the largest municipal electricity undertaking in the country and was the most important telephone centre outside London. The deputy mayor, Councillor E. R. Canning, replied. Mr. H. Joseph, Dr. Raymond Priestley and Mr. H. Hooper also spoke.

At the annual dinner of the staff and employés of the Whitehaven Corporation electricity undertaking held on November 26th, a canteen of cutlery was presented to **Mr. L. B. Hogarth,** O.B.E., A.M.I.E.E., A.M.I.Mech.E., to mark the completion of his twenty-five years as borough electrical engineer and manager. Mr. Pellatt (charge engineer), the oldest employé, referred to the happy relationship which had always existed between Mr. Hogarth and his staff, and in asking him to accept this token of their esteem and respect, together with a handbag for Mrs. Hogarth, wished them both good health and happiness and expressed the hope that Mr. Hogarth would long remain their chief.

On Wednesday last the directors and management of Salford Electrical Instruments, Ltd., gave a dinner at the Manchester, Ltd., Manchester, in honour of thirty-one employés (twenty-nine men and two ladies) who have been in the service of the company for over twenty-one years. The chief guest of honour was **Mr. T. Pritchard,** who has worked for the company since 1890.

Obituary

Mr. S. Kates.—The death occurred in Birmingham on Monday last of Mr. Sidney Kates, manager of the Fittings Department at the Glasgow branch of the General Electric Co., Ltd. Mr. Kates joined the staff of the G.E.C. at Head Office before the war, and during the war served as a naval engine-room artificer. He rejoined the staff in 1919 and was employed in the fittings drawing office in London until 1923, when he was promoted to the position at Glasgow which he held until his death. Mr. Kates carried through many important contracts for the G.E.C., but his principal achievement was his work in connection with the Empire Exhibition this year. The effective lighting displays at this event were very largely attributable to Mr. Kates' thorough knowledge of fittings design and illuminating engineering. He took a prominent part in the social life of the branch, being an excellent golfer and a good all-round sportsman. He leaves a widow and four children.

The late Mr. S. Kates

Mr. J. A. Morton.—We regret to announce the death of Mr. James Arthur Morton, of British Insulated Cables, Ltd., Prescot, which occurred on Monday last at his home in Huyton. Mr. Morton joined the engineering staff of B.I. Cables in 1900 and soon afterwards took charge of the contract estimating department. In March, 1928, on the retirement of Mr. S. P. Doudney, he was appointed superintendent of the entire estimating department. A member of the Institution of Electrical Engineers, Mr. Morton served on a number of technical committees. He was a scientist, artist and scholar, and had given lectures on such subjects as art, literature and music. He leaves a widow, son and daughter.

Mr. J. H. Loosemore.—The death of Mr. J. H. Loosemore at the age of fifty-seven in hospital at Wimbledon, on November 23rd, broke a record of service with Callender's Cable & Construction Co., Ltd., for between them, he and his two brothers, Messrs. G. H. and P. Loosemore, had been on the company's staff for a period totalling 110 years. Jack Loosemore was known throughout the country in electrical circles, especially among contractors and their local associations. He joined Callender's in March, 1900, and was assistant to the cashier from 1901 until 1921, when he was appointed cashier at the head offices at Hamilton House. In 1930 he became travelling inspector and supervisor of sales offices.

Mr. P. W. Rands.—We regret to announce the death of Mr. Paul W. Rands, electrical wholesaler, of Abbey House, Westminster, S.W.1, which occurred on November 27th at the age of seventy-nine.

Switch Testing in Belgium

THE switch testing installation established by the Ateliers de Construction Electriques de Charleroi, Belgium, is contained in a group of buildings, one of which houses the transformers and switches, as well as some of the test bays, another houses the control and recording apparatus, and the third accommodates the 3,000-RPM generator that produces 18 kV, three-phase, which can be stepped up to 250 kV.

The generator was built with a damping circuit of low resistance and asynchronous impedance, and as it is only used intermittently, ventilation ducts were reduced to the minimum. The exciter coils (aluminium to reduce the effects of centrifugal force) are placed between two damping coils, one at the bottom and the other at the top of the rotor slots. The coils are keyed into position without provision for ventilation, and they are much less high than in an ordinary alternator of similar size. This design has permitted a reduction of the asynchronous impedance to 0.18 ohm per phase, giving a symmetrical short circuit capacity of 1,800,000 kVA.

The stator windings are divided into half phases, so arranged that they can be connected in star, parallel-star, delta or parallel-delta. The star connection is the only one for which the theoretical maxima of 1,800,000 kVA and 57,600 A per demi-phase can be attained. The impedance of the bus-bars in the cases of the other forms of connections reduces these figures somewhat. Considering the asymmetry of the current introduced by the DC component, however, the most efficient connection for most tests is parallel-delta, which permits an amplitude of 324,000 A. Oil for the bearings is provided by a pump on the generator shaft and by another operated by a motor, while a reservoir under pressure serves as an emergency connection in case of breakdown of the others.

A 2,500-HP, 3,000-RPM asynchronous motor for driving the generator operates from the mains and is disconnected before the beginning of the short circuit. To save the motor from excessive strains, the coupling between it and the generator shaft is of the maximum torque type, which allows the connection to slip in case of too high a strain. The motor also serves as a brake on the generator by energising the stator with DC and allowing the rotor to feed its starting rheostat.

The connection between the generator and the switch to be tested is made through two circuit-breakers, one of which serves to create the short circuit and the other to protect the generator in case the switch under test fails to open. For tests at pressures higher than 18 kV step-up transformers are used.

The transformers are single-phase units designed for 45,000 kVA per phase or 135,000 kVA three-phase. Their reactance is 0.055 ohm per phase, so that the short circuit kVA delivered is 1,380,000. Two sets of transformers of these characteristics are provided, each having a different transformation ratio. By connecting these either singly or in parallel, and either star or delta, it is possible with an 18-kV primary to obtain 41, 71, 82 and 143 kV with the first group only and 72.5, 125.8, 145, 251.6 kV with the two groups in series.

Commercial and Industrial News

E.I.B.A. Benefactors. Electrified Brickworks. New Showrooms at Rochester. High-pressure Pumps. Cooker Propaganda at Erith. Fair Trading Policy.

Shop Window Lighting in Fulham

WITH a view to encouraging the improvement of shop window lighting in Fulham the borough electrical engineer has prepared a scheme for assisting shopkeepers to install a modern system of lighting. It is proposed that one of the sales service esngineers should be allocated to the preparation of design after receiving a special course of training from E.L.M.A., and it will be imperative for the shopkeeper to accept the design for lighting put forward by the Electricity Department. The shopkeeper will be required to purchase the installation under a hire-purchase agreement, subject to the following conditions: that a deposit equal to one-third of the total cost shall be paid before the work is commenced; that the outstanding balance, plus interest at the rate of 5 per cent. per annum shall be paid over a period of either six months or twelve months; and that the maximum cost of an installation shall be £35.

The E.I.B.A.

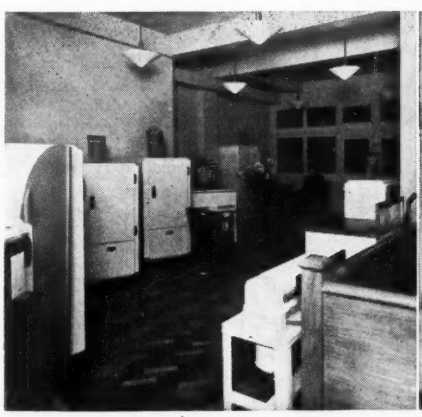
In our report of the E.I.B.A. ball last week we mentioned that an anonymous benefactor had offered the sum of £2,000 to the Association if four others contributed a similar amount each before the end of the year. Mr. H. S. Fothergill informs us that a second person, who also wishes to remain anonymous, has offered to make up his year's contributions to £2,000 so that it now remains for three others to follow suit.

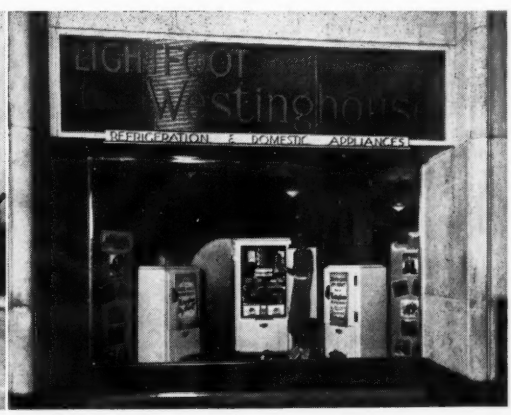
We illustrate on page 794 the handsome cup which Sir Montague Hughman has presented as a trophy in an E.I.B.A. golf competition. It is known as the Nuremberg Cup and was made about a hundred years ago. It is in silver gilt, weighs 120 oz., and is 27 in. high. There will be a number of regional competitions for which individual trophies are to be presented, and an agreed number of players from each region will qualify for the final. Entry cards for the competition will be obtainable shortly from the Association, price 2s. 6d. For those readers who wish to obtain a block of entry cards, vouchers are now available which can be changed for cards when they are ready. The Court of the Association has passed a hearty vote of thanks to Sir Montague for his kindness.

At the ball held by the Association in Newcastle-on-Tyne on November 25th it was announced that the North Counties Area of the Association is to be divided into two areas. Ald. J. R. Potts, chairman of the Carlisle Corporation Electricity Committee, representing the Western Counties, agreed to the formation of the new area, which is to be called the Cumberland and West Counties Area. The object is to lighten the work of the Northern Counties Area officials. The ball was attended by nearly 400 guests, including the president, Mr. E. E. Sharp, who were received by the chairman of the Northern Counties Area, Mr. N. S. Tennant and Mrs. Tennant.

Electricity in Brick-making

The output of the works of J. & W. J. Saunders (a branch of the Western Counties Brick Co., Ltd.), at Pinhoe, near Exeter, has increased by about 65,000 bricks per week since electrical operation was introduced. The installation was carried out by Hucklebridge & Son, of Exeter, using Callender cables throughout, tough rubber sheathed and lead sheathed single wire armoured. A fan drawing gas from the kiln has been in continual use, night and day, driven by a 20-HP motor. The brick machines are operated by a 5-HP motor, and each makes 5,600 bricks per day. The pistons are electrically heated (220 V, 400 W) with four elements to each machine. The grinding pans are driven by 30-HP motors, while the kibbler for crushing the shale has a 20-HP motor, the speed of which is variable from 730 to 50 RPM. There is a 7.5-HP motor for the elevator and a 4-HP motor for the conveyor. Automatic stoking of the kiln is employed, with two 1-HP motors which work continually night and day. A 4-in. triple action pump for pressure washing on the elevator buckets is driven by a 60-HP motor, with a working pressure of 140 lb. per sq. in.

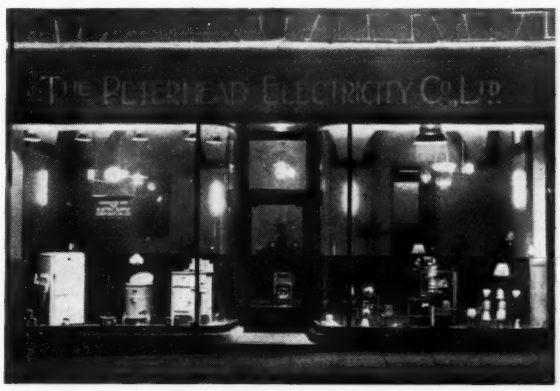




Interior and exterior views of the Lightfoot Refrigerator Co.'s showrooms in Tothill Street, Westminster

American Refrigerator Development

According to *Electrical Merchandising*, a long-term contract has been arranged between the International Standard Electric Corporation and the Gibson Refrigerator Co., Greenville, Michigan, whereby the former company acquires the sales and manufacturing rights in foreign countries of certain Gibson products as well as technical advice and assistance to enable the factories of the Standard Corporation's associated concern, the International Telephone & Telegraph Corporation, to manufacture household refrigeration products in foreign countries under their own trade marks. The I.T. & T. has factories in the principal European countries, Australia and the East.



The new showrooms of the Peterhead Electricity Co., Ltd.

New Peterhead Showrooms

On November 21st the new showrooms and offices of the Peterhead Electricity Co., Ltd., in the Marischal Street ground floor of the Town House were opened. The ceremony was attended by members of the Town Council, who were received by Mr. D. McKechnie, the local manager of the company. Mr. J. Eustace, a director and chief engineer of the company, was also present. Following the inspection of the premises, a feature of which is the "corrected window lighting" combining mercury vapour lamps and gas-filled lamps, the company adjourned to the Palace Hotel for tea. Mr. McKechnie, who presided, said that the purpose of the showroom was to enable the company to give greater service to the consumers.

New Domestic Appliance Showroom

A representative display of Lightfoot and Westinghouse domestic appliances is now to be seen permanently at up-to-date new showrooms just opened by the Lightfoot Refrigeration Co., Ltd., at Steel House, Tothill Street, Westminster, S.W.1. An open-type window permits a glimpse inside the showrooms, and a topical window display at present on view "ties up" with the film "There Goes My Heart," in which Westinghouse equipment appears conspicuously. On the ground floor a complete range of domestic refrigerators from the smallest model (3.2-cu. ft.) to the largest (9.5-cu. ft.) is accompanied by an example of the semi-commercial type, as well as various washing machines, ironers, streamlined irons, vacuum cleaners and a new cabinet-type dish washer. A separate department for commercial equipment has been provided downstairs, apparatus shown there including specimens of both Westinghouse and Lightfoot compressors, ice cream makers and conservators, refrigerated display cabinets, a direct-expansion milk cooler, a new bottle and cask cooler for public-houses, cellar coolers, a complete cold room, a new type of milk bar, and service

cabinets, including a special model finished in galvanised mottled vitreous enamel for fish fryers.

Power Plant Specifications

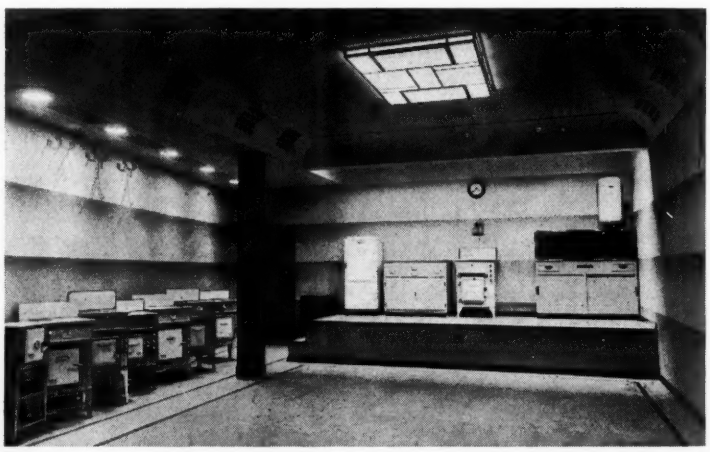
We have received from the British Standards Institution a white print compiled with the aid of the London Power Co. which shows a cross-section of a modern power station. On

Artificial daylight has been provided to good effect at the new home of the Royal Society of Painters in Water Colours in Conduit Street, London, W.1. In designing the installation G.V.D. Illuminators, Ltd., endeavoured to keep the centre of the room dark to create contrast

each side of the drawing are marginal references to British Standard specifications applicable to the various items with clear indications as to which is which. Most of the specifications relate to the performance and testing of equipment, but where constructional features are standardised also these are shown.

New Electricity Showrooms at Rochester

The Kent Electric Power Co. was incorporated by Act of Parliament in 1902 and began trading on January 1st, 1905, when the Chatham & Rochester Electric Lighting Co., Ltd., was taken over. In 1905 the power station in Chatham was burnt down, and a supply was taken temporarily from the London Electric Supply Co., Ltd. A new station with a capacity of 5,000 kW was commissioned in 1907, but this was superseded when in 1926 a supply was drawn from the Barking station of the County of London Electric Supply Co., Ltd. Last year the Kent company received the assent of Parliament to erect



The demonstration hall of the new Rochester showrooms of the Kent Electric Power Co.

a new station near Dartford, which will have an installed capacity, for the first section, of 120,000 kW, and will be in operation in 1940, serving to supplement the Barking supplies. Some idea of the growth of the Kent Company's business may be gauged from the fact that the output has risen from 363,000 kWh in 1905 to over 212 million kWh in 1937, and the number of consumers has increased during the same period from 344 to 32,000.

The rapid increase in business has necessitated new headquarters for the administrative staff, and new showrooms. These were opened on November 21st at 178-184, High Street, Rochester. County House, as the new premises are known, has been completely reconstructed within the walls of the original building. The frontage has been entirely modernised and has a canopy extending the whole length of the building, which consists of four floors and a basement. The main entrance opens into the showrooms and lounge, at the back of which are large exhibition bays. The decoration of the showrooms has been designed to give an atmosphere of brightness, and the reflected lighting from the corniced ceiling gives a soft brilliance. The main showroom has a comprehensive range of lighting fittings, electric fires, cookers, refrigerators, washing machines and many other appliances for the home. The exhibition bays include a room seating sixty people in which demonstrations of all kinds of electrical appliances will be given. There are also a model kitchen and bathroom, while another bay displays all types of electrical fittings. Leading from the lounge there is a private room for interviews. The company's staffs, administrative, engineering, development and clerical, occupy the remaining floors, while the basement is used for the storage of records. Up-to-date lighting and ventilation have been installed, and the heating of the building is by electricity on the electrode boiler thermal storage system. The whole of the electrical installation has been carried out by the company's own staff.

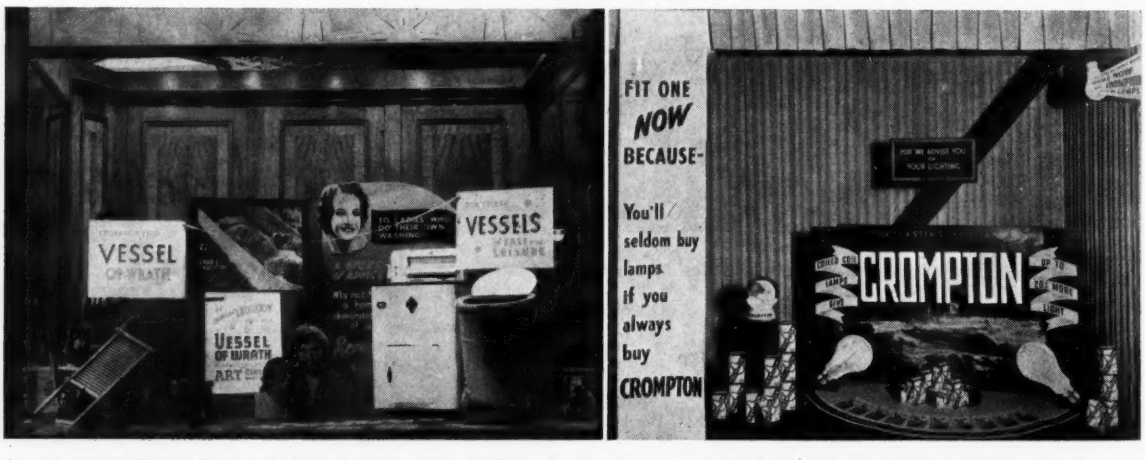
Radio Altimeter for Aircraft

A direct reading instrument which shows how high an airplane is above the ground over which it is flying has been developed in the Bell Telephone Laboratories in America and publicly demonstrated recently in planes belonging to United Air Lines. According to the Western Electric Co., Ltd., the new instrument operates on the principle of a radio echo from the earth. The frequency of the outgoing wave is varied according to a straight line curve. The return wave, being delayed by transit to the ground and back, has the frequency of an earlier epoch; how much earlier is determined at each instant by the difference between the frequencies of the outgoing and returning waves, which is proportional to the length of path. It is determined by generating a "difference frequency" by modulation and measuring that frequency with a meter.

Two Window Displays

During the recent showing of "Vessel of Wrath" at a local cinema the Bury Corporation Electricity Department took the opportunity of staging a topical window display in which the electrical method of clothes washing was cleverly compared with the old arduous method of tub and scrubbing board.

Crompton Parkinson, Ltd., have prepared a Crompton lamp window display which has been installed in many shops throughout London and the provinces. With a companion



A topical display in the window of Bury Electricity Department showroom and (right) a Crompton lamp window display

"Kye" lamp display it forms part of an intensive sales campaign at present being conducted by the company.

Electricity in Home Planning

How the education of the public in the benefits of electricity in the modern home can improve housing conditions was emphasised by Mr. A. S. Watson, of the East Anglian Electric Supply Co., Ltd., at a luncheon given by the Ipswich and District Electrical Association to Suffolk architects and builders at the Great White Horse Hotel, Ipswich, on November 22nd. The chairman, Mr. H. E. Blackiston (president of the Association and chief engineer and manager of the Ipswich Corporation Electric Supply and Transport Department) said he understood that there had not been a house built in Ipswich in the last seven years without an electric lighting installation. Mr. Watson, who spoke on "Electricity in Home Planning," said electricity was one of the most versatile aids that man had the privilege of using. Other forms of energy and fuel gave us heating and lighting, and very little else, but electricity gave us added benefits of power and entertainment. In electricity abundant forces were given to mankind to use, as it was hoped, in the right way, and for the benefit of civilisation. Dr. J. W. Hunter, Ipswich Medical Officer of Health, said that in public health statistics it was calculated that to-day we were given another fifteen years of life. Electricity enabled us to enjoy that extra span.

The fourth festival dance of the Association will be held on December 2nd at the Felix Hotel, Felixstowe.

An Electric Heating Campaign

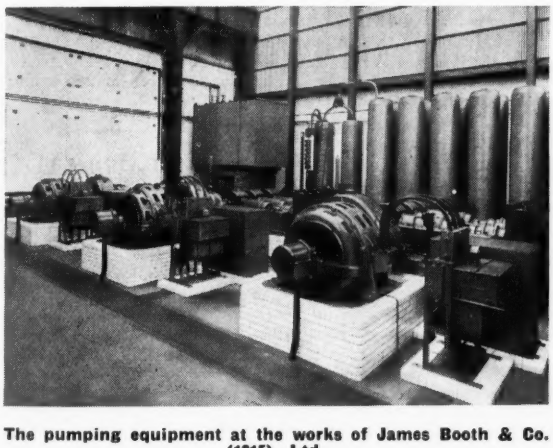
An extensive publicity scheme to popularise electric heating has been put into operation by E. K. Cole, Ltd., who have introduced a new advertising character, "Old Draughtie," to be featured in "Thermovent" Press advertising, bus posters, window displays, poster stamps and in special literature now available to stockists.

Woollen Mill Electrification

With reference to the note in our last issue regarding the electrification of the woollen mills of Humphrey Bradley, Tingley Mills, Morley, we are informed by the Morse Chain Co., Ltd., that a number of its chain drives were installed in connection with this scheme.

High-pressure Pumping

Considerable extensions to their equipment for producing light alloy pressings have recently been completed at the Abberley Street Works, Birmingham, of James Booth & Co. (1915), Ltd. The plant is engaged principally in the production of aircraft propellers and pressings for large crank-cases and includes a 12,000-ton vertical forging press, a similar 1,200-ton press and a 2,000-ton horizontal extrusion press. Power is supplied to the presses by an air-loaded hydraulic accumulator having a working pressure of 5,000 lb. per sq. in. The



The pumping equipment at the works of James Booth & Co. (1915), Ltd.

water level in the accumulator is maintained by three three-throw horizontal pumps. The hydraulic valves between the pumps and the accumulator are actuated by solenoids that are controlled by relays, the operation of which is dependent upon the water level, so that although the pumps run continuously water is only supplied to the accumulator as demanded by the presses. Should the water fall to a dangerously low level as a result of a burst pipe or similar cause the main outlet valve will close automatically and at the same time give audible warning by an alarm siren. Each pump is driven through gearing by a 550-HP slip-ring induction motor, running at 590 RPM on a 400-V three-phase, 50-cycle circuit. The motors (which, together with the control gear, were manufactured and supplied by the General Electric Co., Ltd.) are of the standard open type with ring-lubricated bearings, mounted in heavy pedestal end-brackets. Brush-lifting and short-circuiting gear is fitted to each machine. The control equipment is hand-operated, comprising a stator circuit-breaker of the oil-immersed draw-out pattern, which is interlocked with a liquid rotor starter. Under-voltage and over-current releases are provided, while an ammeter is mounted on each circuit-breaker. The pump and accumulator layout occupies the minimum floor space without affecting accessibility.

Cooker Propaganda at Erith

Continuing its campaign for popularising electric cooking the Erith Corporation Electricity Department recently held a cake-baking competition confined to users of electric cookers.

Entries for the cake-baking competition recently held by Erith Electricity Department

Altogether about eighty entries were received from 3,000 users of electric cookers, which is quite good when it is considered that a certain amount of expense was involved in making the entry. The standard of the entries was very high and great interest was shown by competitors in comparing their entries with that of others. At the exhibition of the cakes opportunity was taken to demonstrate electric cooking and other domestic applications of electricity. By the sale of cakes to the competitors and visitors a substantial amount of money was realised and handed to the local hospital.

The Dutch Electrical Industry

In Holland last year the electrical manufacturing industry showed a marked recovery. The number of concerns—excluding those in the radio-telegraph and radio-telephone branches—increased to forty-six, as compared with forty-one in 1936. The total number of persons employed in the industry rose from 4,745 in 1936 to 6,453. The total value of iron and steel,

Fair Trading Policy

Council's statement

THE Electrical Fair Trading Council held its annual meeting on November 18th and, in a statement issued subsequently, referred to a number of matters which have been under consideration during the past year.

The position of decorators, decorative specialists and garages was one important subject upon which a ruling was given, and the relevant schedules of the Policy were amended in accordance with that ruling. We gave full particulars in our issue of July 22nd last.

Reference is made to a practice, said to be common among certain wholesalers and the general or departmental class, whereby a dealer-customer accepted by any one department of the wholesalers is automatically regarded as a trade buyer for all other departments. The Council recommends that manufacturers and suppliers shall not accord wholesale terms to any general wholesaler unless they are given an undertaking that the wholesaler's electrical section will be conducted strictly in accordance with the Fair Trading Policy.

There are also firms and organisations who make a regular practice of supplying goods to the general public at prices considerably lower than the recognised list prices. It is strongly recommended that manufacturers and suppliers shall individually take steps to ensure that the practice is stopped immediately.

It is emphasised that the Policy is intended to apply to all classes of electrical goods which normally reach the user through one or other of the distributing channels defined in the policy but it is not limited to the products actually scheduled.

The Council states that there is ample evidence that the Policy is proving a most valuable asset to the electrical industry. Due to its increasing popularity it has been decided to issue it in a convenient booklet form for the use of salesmen and selling staff generally.

copper and copper wire, brass and bronze, and porcelain and glass used was nearly doubled. At the same time the value of the products turned out rose from £1,500,000 to £2,400,000. Works constructing turbo-generators, dynamos, rotary convertors, rectifiers, transformers and motors numbered eight, one more than a year before, and manufactured machines to the value of £650,000 against £390,000. There were twenty-two factories making measuring apparatus, switchgear, resistances and heating appliances with a total output valued at £860,000 (against £470,000) about 60 per cent. of the total being for the home market. The manufacture of vacuum cleaners was carried on by eleven concerns which manufactured 73,700 valued for sale at £195,000, nearly all on home account.

Under-floor Ducts

Another specification has been issued by the British Standards Institution for under-floor ducts, with fittings, for electrical services. B.S.S. 774, issued in June last, is concerned with steel ducts wheras B.S.S. 815 now announced deals with non-metallic ducts, such as may be used for general, local and desk lighting; P.O. and intercommunication telephones, bell signalling circuits; small power circuits for office machines and local heating points. This specification covers the duct material and tests for it, as well as for galvanising, sherardising, enamelling, continuity of bonding devices, &c. It has been considered inadvisable to standardise shapes and sizes, so that for the present dimensions are merely recommended, pending reconsideration in twelve months' time. Copies of the new specification are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, at 2s. 2d. each, post free.

Oil Engine Company's Centenary

Last year Blackstone & Co., Ltd., of Stamford, celebrated their centenary. In "A Hundred Years of Progress" (1s. net: F. Bailey & Son, Ltd., Dursley), Mr. T. L. Price reviews the history of the company since it was founded by Henry Smith, who was born in the year of the battle of Waterloo. Two years ago the company came into active association with R. A. Lister & Co., Ltd., of Dursley, and Mr. Percy Lister is its chairman.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price November 30th.	Fortnight's inc. or dec.
a Acid Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£37	—
a Ammonia, Muriate (large crystal)... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19	—
a Potash, Chlorate ... ... per lb.	3½d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 8s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda, Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium, Bichromate, casks ... per lb.	4¼d. net.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£94	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2½ to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£181	—
Grade II ... ... ,,	£127	—
Grade III ... ... ,,	£70	—
c Brass (rolled metal 2" to 12" basis)... per lb.	8¼d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	11¾d. to 1/–	¼d. dec.
c ,, Wire, basis ... ... ,,	8¼d.	¼d. dec.
c Copper Tubes (solid srawn) ... ,,	1/1d.	¼d. dec.
g ,, Bars (best selected) ... per ton	£80	—
g ,, Sheet ... ... ,,		£4 dec.
g ,, Rod ... ... ,,		—
d ,, (Electrolytic) Bars ... ,,	£49 10s.	£3 15s. dec.
d ,, ,, Wire Rods ... ,,	£54 5s.	£3 15s. dec.
d ,, ,, H.C. Wire ... per lb.	7 7/16d.	¼d. dec.
f Ebonite Rod ¼" dia. & up. ... ,,	1/10 to 2/5	—
f ,, Sheet ⅛" thick & up ... ,,	1/5 to 1/10	—
n German Silver Wire, Nos. 1 to 12... ,,	2/4	—
h Gutta-percha, fine ... ... ,,	Nom.	—
h India-rubber, Para-fine ... ... ,,	7¾d.	¼d. dec.
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s.	—
i ,, Wire galv. No. 1 P.O. Qual. ... ,,	£23	—
g Lead, English Pig ... ... ,,	£18	5s. dec.
g Mercury ... ... per bot.	£15	15s. inc.
e Mica (in original cases) small ... per lb.	10d. to 2/–	—
e ,, ,, ,, medium ... ,,	6/– to 12/6	—
e ,, ,, ,, large ... ,,	13/– to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/1d.	¼d. dec.
p ,, ,, rolled strip & sheet ,,	11¼d.	¼d. dec.
p ,, ,, wire ... ... ,,	1/1¼d.	¼d. dec.
o Platinum ... ... per oz.	£7 10s.	—
d Silicum Bronze Wire ... ... per lb.	8¾d.	¼d. dec.
g Spelter ... ... per ton	£13 13s. 9d.	13s. 9d. dec.
g Tin, Block (English) ... ... ,,	£214 10s.	£1 5s. dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/6	—

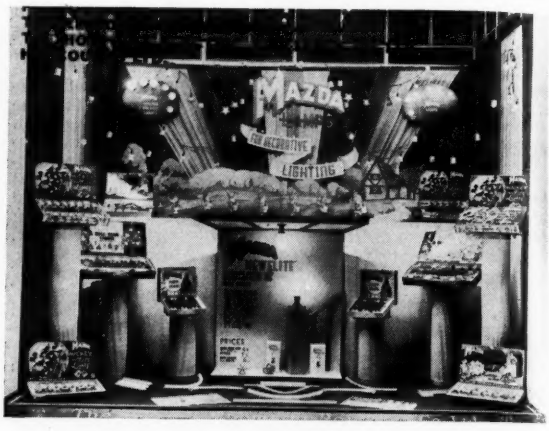
Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

A Christmas Window Display

The accompanying illustration shows a display recently installed in the British Thomson-Houston Co.'s Crown House, Aldwych, window. It features lamps for decorative lighting, and the colourful background consists of cut-out figures of the Seven Dwarfs carrying a "Mazda Snow White" outfit. In



A B.T.H. window display of decorative lamps

the foreground a built-up model shows the application of the "Mazda Newelite." Around this centrepiece the range of the company's decoration lights are displayed. These comprise Snow White, Mickey Mouse, Bell-Star and Fairy Light outfits suitable for decorative and festive illuminations.

Trade Announcements

B.E.N. Patents, Ltd., are removing to new works and offices in the new year. On and after January 3rd communications should be sent to Hughenden Avenue, High Wycombe, Bucks (Telephone: High Wycombe 1630; telegrams: "Tooinwun, High Wycombe").

The business of E. Dawson & Co., 10, Gray's Inn Road, London, W.C.1, which has been carried on by Mr. W. E. Pott since 1915, and latterly in conjunction with his partner, Mr. W. Taylor, has now been converted into a private limited company under the style of E. Dawson (Lamp Factors), Ltd., as from December 1st. The conduct of the business will be exactly as before under the directorship of Messrs. Pott and Taylor. The registration of the company is recorded in our Financial Section.

New South Metropolitan Showrooms

Bennie Lifts, Ltd., inform us that they installed a super-silent speed lift in the new Lewisham showrooms of the South Metropolitan Electric Light & Power Co., which were described in our issue of November 18th.

Orders for Diesel Plant

The English Electric Co., Ltd., has recently received a number of orders for Diesel plant, including eight 330-BHP engines, seven of which will be coupled direct to English Electric generators. The engines are being supplied to Gibraltar, Fiji, Channel Islands, Nicaragua, and South Africa, apart from home orders. Some of these sets are for electricity and power supply in connection with lighting, mining work, and quarries. In addition, engines of 165 BHP, 250 BHP, and 750 BHP have been ordered for such destinations as Canada and Gibraltar.

A.R.P. in a Gas Department

Arrangements whereby the manager and staff of the New Wortley gasholder station may carry on in safety during an air raid have been perfected by the incorporation of an "Edis-wan" loudspeakerphone installation. During the wiring of the equipment for normal intercommunication service, provision was made in the wiring for each unit, including the master, to be removed to various bomb-proof shelters where remote control apparatus for operating the gasholder station has been installed.

New Catalogues and Lists

Premier Electric Heaters, Ltd., Keeley Street, Birmingham, 9.—A 44-page illustrated art catalogue of domestic electrical appliances.

Renold & Coventry Chain Co., Ltd., Renold Works, Didsbury, Manchester.—A brochure dealing with the use of chains in the textile industry.

V. H. Iddon, Ltd., Harper Road, Wythenshawe, Manchester.—Leaflets dealing with an all-insulated handlamp and a moulded ceiling fitting.

Heyes & Co., Ltd., Wigan.—A catalogue of flameproof lighting fittings.

Hopkinsons, Ltd., Huddersfield.—A folder dealing with "Hylift" safety valves for boilers.

Electro Dynamic Construction Co., Ltd., St. Mary Cray, Kent.—New editions of the company's radio and television convertor leaflets.

Aberdare Cables, Ltd., 40-43, Chancery Lane, London.—A well-produced and profusely illustrated art booklet dealing with the manufacture of cables, including technical specifications.

Peterborough Extensible Electric Lamps, 100, Princes Street, Peterborough.—Details of the "Pel" extensible table and bench lamp.

Lightfoot Refrigeration Co., Ltd., Abbeydale Road, North Circular Road, Wembley.—A pamphlet describing equipment for cooling beer and perishable foodstuffs.

British Thermostat Co., Ltd., Windmill Road, Sunbury-on-Thames.—The first of a new series of progress sheets.

Bill Switchgear, Ltd., Aston Lane, Perry Barr, Birmingham, 20.—Details of two new combined switch-fuses.

R. Cadisch & Sons, Red Lion Square, London, W.C.1.—A 20-page catalogue of Christmas gifts.

T. Whittle & Sons, Ltd., Warrington.—Pamphlets giving details of V-belt drives and leather belting.

Simplex Electric Co., Ltd., Broadwell Road, Oldbury, Birmingham.—A catalogue describing the "Under Floor Duct System" for floor surface wiring.

R. A. Lister & Co., Ltd., Dursley, Glos.—Particulars of a new air-cooled engine.

Private Arrangement

J. H. Cooper, electrical engineer, 83, Killigrew Road, Falmouth.—At the recent meeting of the creditors of the above a statement of affairs was submitted showing liabilities of £878, and in addition there were fully secured creditors for £1,118, who held a charge on the freehold premises. The total assets were £1,375, leaving a surplus of £496. It was decided that the matter should be dealt with under a deed of assignment to Mr. R. M. Lang, Falmouth, and Mr. R. F. Bendall, of Poppleton & Appleby, Birmingham, with a committee.

Bankruptcy Proceedings

S. Herzberg, electrical dealer, 11, Victoria Dock Road, Canning Town, London.—Receiving order made November 22nd on a creditor's petition. First meeting December 6th and public examination February 16th at Carey Street, W.C.2.

J. R. Johnston, electrical engineer, 13, Burnley Road, Padiham.—Receiving order made November 22nd on debtor's own petition. Public examination January 9th at the County Court House, Bankhouse Street, Burnley.

W. J. M. Edwards (Radio Exchange Co.), radio dealer, 54, Cowbridge Road, Cardiff.—Receiving order made November 19th on debtor's own petition. First meeting December 6th at 34, Park Place, Cardiff. Public examination January 13th at the Law Courts, Cardiff.

F. W. Ames, electrical engineer, 73, Havelock Road, Bognor Regis, lately trading at 20, Longford Road, Bognor Regis. Public examination February 3rd at the Court House, Brighton.

A. Reid, radio specialist, 1, Bridge Street, Neston.—Trustee, Mr. J. Allcorn, Government Buildings, Victoria Street, Liverpool, Official Receiver, released November 15th.

M. Healey, radio dealer, 51, Broomhill Road, Bulwell, Nottingham.—Trustee, Mr. A. J. Rogers, 22, Regent Street, Park Row, Nottingham, Official Receiver, released November 15th.

A. C. Hall, electrician, 65, St. Thomas's Road, Worthing.—First and final dividend of 10d. in the £, payable November 30th at 8, Old Steine, Brighton.

C. Clewer (C. & F. Radio Service), radio dealer, 1006, Coventry Road, Hay Mills, Birmingham.—Receiving order made November 17th on debtor's own petition. Public examination January 4th at the Court House, Birmingham.

L. Cole (Netherfield Radio Stores), radio and electrical engineer, 5, Victoria Road, Netherfield.—Receiving order made November 18th on debtor's own petition.

A. C. Dobbing and **A. Ll. Rothery** (Ripon Electrical Co.), electrical engineers, 39, Kirkgate, Ripon (joint estate).—First and final dividend of 2s. in the £, payable November 30th at Lantern Tower Chambers, Coppergate, York.

Company Liquidations

C. F. Turner, Ltd., electrical and wireless engineers, Wickham Road, Shirley, Croydon.—Under the compulsory liquidation of this company the first meetings of creditors and shareholders were held on November 23rd at the Board of Trade offices, Carey Street, W.C. Mr. Cowen, Assistant Official Receiver, reported that the company was formed in August, 1936, to acquire as a going concern a business then being carried on at the above address by Mr. C. F. Turner. The only directors were Mr. Turner and his wife. The accounts filed under the liquidation showed liabilities of £1,079 against assets of £118. The failure of the company was attributed to insufficient capital, to heavy expenses which were not justified by the turnover, to trade depression locally and to decline in receipts through customers taking advantage of the improved travelling facilities from Shirley to Croydon. A resolution was passed for Mr. A. Cripwell, incorporated accountant, London, to act as liquidator of the company.

Wood Electric Manufacturing Co., Ltd., 212-214, Great Portland Street, London, W.1.—At the statutory meeting of the creditors of the above a statement of affairs was submitted showing assets estimated to realise £333, but they were subject to preferential claims of £102, and debentures of £1,244. There was a deficiency as regarded the debenture holders of £1,013, and there were no assets available for the unsecured creditors, whose claims totalled £2,795. It was decided to confirm the voluntary liquidation of the company with Mr. F. G. Baker, of 51/52, Chancery Lane, London, W.C., as liquidator, with a committee.

A. Melville Sidley, Ltd.—Particulars of claims, for final distribution, to the liquidator, Mr. S. J. Hull, 14, High Street, Coventry, by December 12th.

T. Baxter, Ltd.—Particulars of claims by December 23rd to the liquidator, Mr. N. W. Osborne, 11-12, Finsbury Square, London, E.C.2.

Western Electricity Supply Co., Ltd.—Meeting December 30th at Thames House, Millbank, S.W.1, to receive an account of the winding-up by the liquidator, Mr. E. J. Harrison.

South West Electricity, Ltd.—Meeting January 3rd at 130, High Street, Honiton, Devon, to receive an account of the winding-up by the liquidator, Mr. B. R. Dunning.

Hotlock, Ltd.—Winding up voluntarily. Liquidator, Mr. L. Stewart, Avenue Chambers, Southampton Row, London.

W. G. Pearson & Sons, Ltd.—Meeting December 23rd at "East Dene," 4, Charteris Road, Woodford Green, Essex, to receive an account of the winding-up by the liquidator, Mr. H. Cashman.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

NANSON tape.

SIMMONDS magnetic temperature compensating metal.

LANCASTRIAN switch fuses.

Electrical Imports of Chile

Britain's small share

CHILE'S importing capacity has been affected by the depression in the markets which buy her copper and other export products, and her favourable balance of trade has shown a distinct decline this year. The foreign exchange position has not been encouraging to any increase in import trade, and it is therefore not to be expected that last year's record figure of electrical imports will be maintained. The total was about 50 per cent. more than in 1936 and double that of 1935. The United States kept its position as largest supplier with nearly half the aggregate, Germany continued to gain ground in the second place and the United Kingdom contributed only approximately one-eighth of the total.

The following figures showing the imports by countries in the principal groups are extracted from the official returns, values being in thousands of pesos (peso = 6d. for statistical purposes).

	1937. Pesos (000).	Inc or dec. on 1935 Pesos (000).
Lamps—		
Total	2,069	+ 761
From Germany	1,138	+ 455
,, United States	612	+ 102
,, Holland	120	+ 69
,, United Kingdom	28	+ 3
,, Japan	107	+ 83
Radio valves and earphones—		
Total	477	+ 168
From United States	328	+ 78
,, United Kingdom	37	+ 18
,, Holland	39	+ 24
Telephone apparatus—		
Total	1,460	+ 523
From United States	168	+ 35
,, United Kingdom	1,100	+ 417
Telegraph apparatus—		
Total	262	+ 150
From United Kingdom	219	+ 182
,, Germany	2	— 24
Radio apparatus—		
Total	120	— 190
From United States	99	— 52
,, United Kingdom	4	— 117
Insulators—		
Total	216	+ 92
From Germany	43	+ 16
From United States	169	+ 79
,, United Kingdom	4	— 1
Cables and insulated wire—		
Total	3,185	+ 323
From Germany	1,107	+ 260
,, Belgium	76	+ 26
,, United States	1,677	— 23
,, United Kingdom	295	+ 95
Turbines—		
Total†	463	+ 247
Motors—		
Total	1,939	+ 772
From Germany	943	+ 304
,, United States	684	+ 401
,, United Kingdom	128	+ 82
,, Sweden	77	— 19
Dynamos, alternators, converters and unspecified electrical machinery—		
Total	837	+ 207
From Germany	495	+ 90
,, United Kingdom	131	+ 20
,, United States	148	+ 72
Transformers—		
Total	1,038	+ 427
From Germany	354	+ 194
,, United States	620	+ 350
,, United Kingdom	35	— 53
Resistances—		
Total	234	+ 117
From United States	143	+ 80
,, Germany	65	+ 41
Current meters—		
Total	646	+ 216
From United States	299	+ 87
,, Great Britain	11	— 11
,, Germany	324	+ 160
Batteries—		
Total	261	+ 33
From United States	177	+ 10
,, Denmark	15	—
,, Germany	56	+ 24
,, United Kingdom	12	— 1
Accumulators—		
Total	1,553	+ 653
From United States	1,266	+ 566
,, Sweden	57	— 5
,, United Kingdom	18	— 30
Unspecified electrical apparatus—		
Total	1,057	+ 583
From Germany	300	+ 182
,, United States	642	+ 376
,, United Kingdom	92	+ 28

† Mainly from Germany.

Electricity Supply

Lighting, Domestic, Power

Basingstoke.—UNDERGROUND MAINS.—The Corporation is applying for sanction to borrow £4,860 for an extra-high-voltage underground feeder, kiosk sub-station, and distribution mains, for a supply of electricity to a housing estate at Bramblys Grange.

Bexhill.—FIVE-YEAR PROGRAMME.—The Electricity Committee has approved a five-year programme for the expansion of the undertaking. It covers consumers' apparatus for hire, a showroom, mains extensions and replacements, service lines, provision of further sub-stations and equipment, and change of system. The total estimated expenditure is £100,867.

Birmingham.—SUB-STATION.—The Electric Supply Department is to erect a sub-station at Orphanage Road, Erdington.

Blackburn. — CHRISTMAS ILLUMINATIONS. — The electricity undertaking has approved the scheme of the engineer (Mr. R. H. Harral) for decorating Station Square and the Boulevard during the Christmas shopping season with coloured fairy lights and other illuminations.

Cannock.—32 PER CENT. INCREASE IN SALES.—The municipal electricity undertaking in this mining area has experienced a remarkable growth of business in the last two years. In 1937 the chief engineer and manager, Mr. P. Wardle, described the results of the preceding twelve months' operation (20 per cent. increase in kWh sold) as the most satisfactory in the undertaking's 14½ years' existence. He mentioned, however, that the full effect of the connection of six new industrial consumers with an aggregate annual consumption of 2.5 million kWh had not yet been felt. In his report for 1937-38 which we have just received it is revealed that as a result of this additional industrial load and other development sales increased by more than 32 per cent. to a total of 13.2 million kWh. Apart from the much larger industrial demand, domestic supplies improved by nearly 40 per cent. At the end of March last 73 per cent. of the premises in the supply area were connected, the number of consumers having risen during the year by 1,144 to 9,608, of whom 3,070 were supplied through ordinary meters and 6,538 through prepayment meters. Per head of the population sales averaged 275 kWh, an increase of 71 kWh. With the help of cooking demonstrations held at the showrooms the number of cookers on hire was increased from 756 to 1,038, but only ten water heaters were on hire at the end of the period against eight a year before. The total number of electrical appliances on hire increased from 6,322 to 9,150. Although charges were substantially reduced last year, on top of which, in common with other undertakings, increased costs had to be borne, there was a slightly higher net profit. The average price per kWh sold fell from 1.36d. to 1.198d.

Cardiff.—POWER STATION CAPACITY TO BE DOUBLED.—Extensions and developments to cost over £500,000 are announced for the Roath power station. New steam-raising plant is to be put down, a 30,000 kW turbo-alternator provided complete with auxiliary plant, and a new 300-ft. chimney stack and a 200-ft. cooling tower built. Cooling water will be taken from the Rhymney River. The station's capacity will be more than doubled when the scheme is completed.

Croydon.—TELEPHONES IN SUB-STATIONS.—The Electricity Committee is to improve the sub-station telephone system at a cost of £1,641.

MENTAL HOSPITAL INSTALLATION. — The Corporation has arranged for electrical works at a cost of £3,418 to be carried out at the mental hospital.

DEVELOPMENT SCHEME.—As the existing underground sub-station in Wellesley Road and the low-voltage network in the centre of the town have not the margin of capacity which is now desirable, a site suitable for a 6,000-V sub-station has been provided for in the basement of the Electricity Department's new building in Wellesley Road immediately adjacent to the existing underground sub-station. The scheme allows for the new sub-station to supply up to 1,200 kVA to the central network and in addition it will cater for the supply to the new offices and showrooms; it will also provide for a duplicate 6,000-V cable to Grant Bros.' sub-station and will allow for the strengthening and linking up of the existing low-voltage distributors in the George Street, High Street, Katharine Street and Park Lane areas. The estimated cost is £24,274.

STREET LIGHTING.—The street lighting mains are to be extended at a cost of £2,170.

Dover.—EXTENSIONS.—In order to afford a supply of electricity to premises at Whitfield, mains are to be extended at an estimated cost of £120.

Ealing.—SUB-STATION.—The Uxbridge & District Electric Supply Co., Ltd., is to erect a sub-station on the South East Northolt housing estate.

Eccles.—MAINS.—At a total cost of £760 the Electricity Committee is to extend mains to supply eighty-four houses at Winton and seventy-five houses in the vicinity of Barton Lane.

Glasgow.—DECORATIVE LIGHTING.—The Parks Committee is considering a report by the inspector of lighting on a suggestion that a system of decorative lighting should be installed in the parks.

Guildford.—SUB-STATION.—The Mid Southern Utility Co., Ltd., is to erect a sub-station at Station Road, Normandy.

Hastings.—OVERHEAD LINES.—The Town Council proposes to erect overhead lines at Mountfield.

Hull.—STREET LIGHTING.—The Works Committee is to replace gas lighting in various streets by forty-four electric lamps.

Jarrow-on-Tyne. — CABLES. — The North-Eastern Electric Supply Co., Ltd., is to lay low-voltage distribution cables in Stothard Street, Salem Street and Raglan Street.

Leatherhead.—ELECTRICITY CHARGES.—The Urban District Council last week agreed to convene a meeting of all authorities affected by the increase in the charges of the London and Home Counties Joint Electricity Authority.

Leek.—RATE CONTRIBUTION.—A contribution of £1,200—the maximum permissible—from the profits of the electricity undertaking in aid of the rates has been approved by the Gas and Electricity Committee.

Leicester.—GRIT REMOVAL.—The Electricity Committee has decided to spend £32,000 on grit-arresting equipment for the power station.

POWER STATION EXTENSIONS.—The Council's five-year plan for capital works which has been drawn up at the request of the Ministry of Health provides for an estimated expenditure of £430,000 by the Electricity Committee for extensions to the central generating station.

London.—BERMONDSEY.—The Electricity Committee recommends that the rate per kWh for energy used for public lighting should be reduced from 1¾d. to 1½d. per kWh and that the standing charge under the two-part system for lighting business premises should be reduced from 6s. 3d. to 5s. per quarter per 100 W installed.

HAMMERSMITH.—The Electricity Committee is to extend the mains at a cost of £267 to sixty flats to be erected in Chancellor's Road.

A tolerant attitude has been taken by the Electricity Committee towards the growing practice of consumers inserting tokens in prepayment meters, but as these are not always redeemed by the consumer at the time of the meter collection the Committee has given directions for the issue of a notice to offending consumers that, unless the tokens are redeemed within fourteen days, the supply of electricity will be disconnected.

LEWISHAM.—The South Metropolitan Electric Light and Power Co., Ltd., is to erect a sub-station in Abbotshall Road.

POPLAR.—The Electricity Committee is to install a sub-station in the basement of Electric House, Bow Road.

STOKE NEWINGTON.—C. P. Whiteley & Son have been asked to prepare plans for the erection of a sub-station in Manor Road.

ST. PANCRAS.—Prospective capital expenditure by the Electricity and Public Lighting Committee during the next five years amounts to £505,663 (electrical section) and £52,870 (public lighting section). In 1941 and 1942 a sum of £40,000 is included for the provision of a new switch-house at the power station.

WOOLWICH.—When the accounts of the Electricity Department, showing a net surplus of £56,172 and a contribution of £12,000 in aid of the rates, were considered by the Town Council last week Coun. F. W. Beech suggested that the people who had helped to make the profit—the consumers—should derive some benefit. Coun. J. Newman said that unless there was a large increase in consumption it was not likely that the profit shown would be maintained, in view of the higher cost of coal, but he hoped that it would be possible to make some reduction in the tariffs.

Manchester.—LOWER CHARGES.—The Electricity Committee has approved reduced charges for the hire of cookers and water-heaters as from January 1st. The new scales are calculated to benefit existing consumers by £4,000, and to add to business considerably. The quarterly reduction will be from 2s. to 2s. 6d. on cookers and from 6d. to 3s. 6d. on water-heaters.

Mansfield.—SUB-STATION.—The Electricity Committee is to erect a sub-station in the Newgate Lane district and extend cables at a cost of £6,341.

Morecambe.—The Electricity Committee is to improve the supply in the centre portion of the town at a cost of £9,355.

Morley.—MAINS.—The Corporation is applying for sanction to the borrowing of £3,600 for mains.

Mountain Ash.—CHRISTMAS REBATE.—The Council has decided to repeat its usual concession to electric lighting consumers for the December quarter. The lighting flat rate of 2d. per kWh will be subject to 1d. per kWh discount, making a net rate of 1d. per kWh. This is the sixth successive bonus discount granted for the December quarter.

Norwich.—INCREASED CHARGES.—Owing to higher working costs the City Council has decided to increase the electricity charges. The minimum assessment charge for domestic supplies is to be raised from 7s. 6d. to 8s. 9d. per quarter in the city, from 7d. to 8d. per week for Council houses and from 7s. 6d. to 10s. per quarter in fringe and county areas. An increase of 0.012d. per kWh for each shilling and pro rata for each part of a shilling by which the average cost of coal delivered exceeds 17s. per ton is to be made for power supplies on the sliding scale, with a decrease in discounts. Business supply charges are to be increased to 8s. 9d. (minimum) per kW per quarter in the city and 10s. in the county, with reduced discount allowance.

Orrell.—STREET LIGHTING.—A sum of £3,800 is to be spent by the Urban District Council on improving the street lighting.

Oxford.—LOAN.—The Town Council is to apply for sanction to the borrowing of £10,000 for cables, sub-stations, &c.

Penrith.—RURAL SUPPLIES.—Complaints regarding delay in supplying electricity to certain villages in the area were made at a recent meeting of the Rural District Council. It was stated that areas which had been pressing for some time for energy included Soulby, Matterdale and Watermillock. Following a letter from the Mid-Cumberland Electricity Co. asking for co-operation with regard to supplying electricity, the Council decided to notify the company of all building developments in the district in order that the most economic layout of mains could be prepared.

Portsmouth.—SUPPLY TO FINCHDEAN.—Mains are to be extended by the Corporation in order to afford a supply to Finchdean.

Raunds (Northants).—COUNCIL ESTATE SUPPLY.—A tenant of a Council house having requested the Urban District Council to install electricity and arrange for the cost of installation to be repaid by weekly additions to the rent, the Council has decided to investigate the attitude of tenants of fifty houses on the Crow Spinney estate, and to ascertain the estimated weekly addition to rents to recover installation costs. Raunds is within the area of the Wellingborough Electric Supply Co.

Skipton.—NOTIFICATION OF ADDITIONAL LOAD.—In common with other authorities the Electricity Department requires consumers to notify it before connecting additional equipment to the mains. At a recent meeting of the Council the chairman of the Electricity Committee stated that he proposed to advise his committee to institute proceedings where this is not done.

Southall.—SUB-STATION.—The Metropolitan Electric Supply Co., Ltd., is to erect a sub-station in Burns Avenue.

Southend-on-Sea.—OVERHEAD LINE.—The Corporation has authorised the electrical engineer to have an overhead line erected from Branscombe Walk to Parson's Corner, Shoeburyness, at an estimated cost of £340.

Stalybridge.—ACQUISITION OF GLOSSOP UNDERTAKING.—The Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board has decided to promote a Bill to enable it to acquire the Glossop electricity undertaking and to extend the Board's area of supply. It was recently stated that if powers were obtained the Board was not committed to buy the Glossop or any other undertaking.

Stokesley.—RURAL ELECTRICITY.—In reply to a letter from the Rural District Council the North-Eastern Electric Supply Co., Ltd., stated that it was investigating the possibility of supplying electricity to Kirklevington, Crathorne and Picton.

Swansea.—TIR JOHN CAPACITY TO BE INCREASED.—Extension of the Tir John power station was discussed at length at a special meeting of the Borough Council on Tuesday. A deputation of the Electricity Committee had waited upon the Central Electricity Board and, following a discussion on the report, the Council approved of a recommendation of the Committee to install a further 30,000-kW set at the station, bringing its capacity up to 102,500 kW. This compares with a present designed capacity of 120,000 kW. The extension is to be made to meet increased demands in the Board's South-West Area. It is hoped that the new plant will be in operation by the beginning of 1941 and the Board will consider the addition as part of the station which they are taking over in 1940.

Taunton.—LOAN.—Application is being made by the Corporation for sanction to a loan of £18,000 for mains, services, &c.

Overseas

Portugal.—ELECTRICITY SUPPLY PROGRESS.—The report for 1937 recently issued by Signor Ferreira Dias, chief engineer to the Portuguese National Electrification Council, shows that at the end of last year there were 637 generating stations with a total installed capacity of 267,147 kW as compared with 635 stations and 261,825 kW installed at the end of 1936. The number of plants engaged in providing a power supply to the public and for traction purposes is given as 173 (201,140 kW). The increase in installed capacity during 1937, *viz.*, 5,322 kW, is the smallest for some years. Last year's progress (mainly due to two new turbo-generators of 3,500 kVA and 1,750 kVA at the Vila Cova central station of the Hidro-Electricado la Serra da Estrela. The total output during 1937 was 406.1 million kWh as compared with 369.9 million kWh for the preceding twelve months, an increase of about 9.7 per cent. Hydro-electric stations were responsible for 34.2 per cent. of the total. The number of consumers taking a public supply increased from 283,761 to 303,535, an advance of nearly 7 per cent. The principal consuming industries were textile (72 million kWh), pottery and building (32.2 million kWh) and food preparation (26.6 million kWh). The mining industry took 12.6 million kWh and water-pumping plant 11.6 million kWh. A further table shows that of the 6,360,347 population of the country electricity supplies were available to 3,407,789 people. The annual consumption per person to whom a public supply was available averaged 79.9 kWh. The majority of the plants in Portugal are of relatively small size, there being only eight with a capacity over 5,000 kW engaged in public supply. The principal undertakings are the Companhia Reunida Gas e Electricidade, of Lisbon, with an output in 1937 of 96.1 million kWh and the Electrica da Lima e Uniao Portugesa, with 80.2 million kWh. There was approximately 2,965 miles of high-voltage lines at the end of 1937. The 2,652 miles of overhead line included 261 miles operated at over 50 kV, the bulk being supported on steel masts. There are only six electric tramway and local railway undertakings in the country, with a total track length of about 221 miles.

Russia.—POWER PRODUCTION DEVELOPMENT.—According to the *Monthly Review* of the U.S.S.R. Trade Delegation in the United Kingdom about 1,250 million roubles has been assigned for electrical construction work and the new enterprises will add a further 880,000 kW to existing capacity. The output of the power stations in Moscow, Leningrad, the Urals and the Don Basin will be increased and seven new sets with an aggregate capacity of 462,000 kW will be brought into operation. New extensions to electrical transmission lines totalling 1,150 miles are to be effected at a cost of 172 million roubles.

Traction

Blackpool.—NEW TRAMS.—The Transport Committee has asked the manager (Mr. W. Luff) to submit a design for twelve new cars to replace the rack type, which run between Fleetwood and the Blackpool North station. Mr. Luff has a definite design in mind, but details are not being disclosed until they are ready for the consideration of the committee.

France.—NEW SHUNTING LOCOMOTIVE.—A three-axle electric shunting locomotive has been completed by the Electromecanique Co. for the Mines Domainales de Potasse d'Alsace. Electricity is collected by either of two trolley poles, or a pantograph, and operation is possible at any voltage between 400 and 700 V; normal operation is at 600 V. Individual motors on each of the three shafts operate simultaneously, three-pole contactors cutting out the regulating resistances of all three motors at once. Normally, trolley poles are used in the mine yard, while the pantograph is employed between the yard and Richwiller railway station. The switchgear permits the motors to be connected either in series or in parallel and makes it possible to cut one or two of them out of service in case of accidents, and continue operating with the remaining motor or motors. When the motors are in series the whole of the feed goes through the cut-out of the first motor. In this position the locomotive has a one-hour speed of 7.2 km.p.h. When connected in parallel the three motors give the locomotive a one-hour speed of 24.8 km.p.h. with a maximum of 50 km.p.h. Each motor has an individual starting rheostat comprising fifteen taps and operated by nine contactors all actuated by the master controller whether the motors are operating in series or in parallel. A rotary convertor produces DC varying between 120 and 85 V, according to the load and the voltage of the trolley wire, for operating the control equipment and the auxiliaries, as well as the electrical interlocks between the various parts of the equipment. Should the overload relay of one of the three motors act it will trip the cut-outs of all the motors so as not to overload those left in service. A signal indicates which motor caused the operation of the cut-outs. The locomotive has an overall length of 9.33 m. and width of 3.12 m. for standard railway gauge, and each traction motor takes a maximum of 400 A. One of the two locomotives of this type which have been built has motors of 775 HP, while the other has enclosed motors developing 735 HP. The maximum tractive effort is 8,000 kg. for one hour or 12,000 kg. for short periods. This will permit the locomotive to draw trains of 600 tons. The total weight of the locomotive is 48 tons.

One of the new French shunting locomotives

Glasgow.—THE TROLLEY-BUS REPORT.—At a recent meeting of the Transport Committee Councillor Victor D. Warren gave notice of the following motion: "That a special sub-committee be appointed to investigate the circumstances under which the recent report on trolley-buses was framed; to investigate the reason or reasons which caused vital information anent the London Passenger Transport Board's activities to be withheld; and to give the management the opportunity of replying to the criticism now appearing in the Press."

Great Western Railway.—SIGNAL BOX FIRE.—The main line arrival signal box at Paddington (London) station was burnt out last week. The box was one of 200 levers worked electrically.

London.—NEW L.P.T.B. STATION.—On Sunday the new Uxbridge station of the London Passenger Transport Board is to be opened.

Smethwick.—PURCHASE OF TRAMWAYS.—The Corporation is to purchase the tramways in the borough from the Birmingham and District Investment Trust, Ltd.

Communications

Albania.—KING OPENS NEW RADIO STATION.—A *Reuter* report from Tirana states that King Zog opened a new radio station there on Monday with a broadcast of greeting to the nation. The Royal family and high civil and military dignitaries were present. It was the twenty-sixth anniversary of Albania's independence.

Great Britain.—RADIO-TELEPHONY IN THE COLONIES.—On Tuesday Mr. E. Wilshaw, chairman and managing director of Cable and Wireless, Ltd., announced that the Government had offered to create a system of radio telegraph and telephone communication throughout the colonies without cost to the administrations or people concerned. According to *The Times* each of the cable stations where no commercial radio service is at present in operation would be equipped with radio receiving and transmitting facilities, the company bearing the cost of the installations and experiments.

Norway.—PROPOSED 300-KW TRANSMITTER.—It is reported that the Post Office is planning to increase the aerial power of the Lamberseter long-wave broadcasting station, near Oslo, from 60 to 300 kW and eventually to move the station to a more central site in East Norway.

Sweden.—ANTI-INTERFERENCE CAMPAIGN.—The Swedish Post Office is launching an anti-radio-interference campaign on a large scale. A start has been made in collaboration with the local authority at Jonkoping, one of the larger provincial cities, where all trams will be fitted with new types of collectors and other modern noise-suppressing devices. The cost of these measures is estimated at about 1,000 kronor (approximately £50) per vehicle. Similar efforts are subsequently to be made in other Swedish cities.

NEW COMMERCIAL RADIO CENTRE.—The Post Office has forwarded a scheme to the Government for the erection of a commercial radio centre to serve shipping and aviation. Provision is made for eight receiving stations and eight transmitters of comparatively low power. A suitable site has already been secured on the isthmus of Onsala, near Göteborg.

Progress of Rural Demonstration Schemes

WHEN the Bedford rural demonstration scheme was launched in 1930 it was expected that within a few years the project would be earning a profit. These hopes have not as yet been realised and the recent increase in costs has resulted in a postponement of the time when this will be accomplished. The extent of development has been much greater than was anticipated, however, for the availability of cheap electricity attracted industry to the area, with a consequent increase in capital expenditure. In the first year 602,972 kWh was sold at power rates, while last year the quantity was 11,175,000 kWh, the power consumers having increased from two to twenty-two. Apart from factories, 80 per cent. of the 7,246 premises in the demonstration area are connected, the number of farms supplied having risen from 26 to 239. Altogether, electricity supplies have risen from 1,353,000 kWh to 16,678,000 kWh. In the past year the growth was 11 per cent., which was, however, substantially smaller than in the previous year when there was an exceptional expansion in farm supplies due to soil heating and greenhouse requirements and also in industrial supplies through the erection and extension of brickworks, which for the time being appear to have reached their economic capacity. Of the domestic premises and farms supplied 40 per cent. now have electric cookers, the number hired out having risen in the eight years from 148 to 2,331. Water-heating development has been deterred by lack of main water supplies in the lower-rated houses, but there has nevertheless been an increase in heaters and boilers hired out from 13 to 869.

Excluding industrial supplies sales per head of the population amounted to 233 kWh, and with such supplies to 716 kWh. Each farm consumed on the average 2,016 kWh and each lighting and domestic customer 885 kWh, the revenue being 1.34d. per kWh for domestic and shop supplies, 1.17d. for farms, and 0.54d. for power supplies, giving an overall average of 0.794d. compared with 1.685d. in the first year. The average income from lighting and domestic consumers rose from £4.74 to £4.93, the figures for farms being £9.86 and £9.85 respectively. The cost of energy was 0.384d. and of transmission and distribution 0.231d., making a total working cost of 0.615d. per kWh against 0.576d. in the previous year. In addition, capital charges amounted to 0.320d., making 0.935d., while income averaged 0.882d. per kWh. The gross surplus improved from £18,172 to £18,534, but there was an increase in the net deficit from £2,399 to £3,715. It should, however, be borne in mind, as Mr. R. W. L. Phillips, the recently retired borough electrical engineer, pointed out in a previous report, that there is the advantage accruing to the whole undertaking as a result of the scheme by reason of the reduced price paid for electricity due to the larger number of kWh purchased. Up to March 31st last capital expenditure on the scheme amounted to £305,482.

From the annual report of the electricity undertaking at Norwich, where Mr. V. A. Pask is the city electrical engineer, it is learned that steady progress continues to be made in the demonstration area, which was started shortly after the Bedford scheme. From nil the sales have risen to 1,491,500 kWh and the gross revenue to £11,769 per annum.

Parliamentary News

(BY OUR SPECIAL REPORTER)

Placing Cables Underground

IN the House of Commons on November 23rd Mr. Tinker asked the Prime Minister if he would give consideration to setting up a Royal Commission to examine the question of placing electric wires and cables underground.

Sir J. Simon, the Chancellor of the Exchequer, who replied, said that the Prime Minister did not consider that any good purpose would be served by referring this question to a Royal Commission.

Mains in Roads

Mr. O. Lewis asked the Minister of Transport whether the consultations between his department and other departments interested in the problems arising from the right of suppliers of water, gas and electricity to lay their mains under the public highways, had made any progress; and whether he had further considered the desirability of moving to set up a Joint Select Committee to examine the present state of the law relating to this subject.

Mr. Burgin said that he hoped to take an early opportunity of moving for the appointment of a Joint Select Committee.

East Anglian Supplies

Colonel Heneage asked the Minister of Transport how many parishes in the Grimsby, Caistor, and Louth Rural District Council areas were still to be supplied with electricity; how many had been supplied; and what steps he was taking to hasten the supply of electrical power to these agricultural areas.

Mr. Burgin said that he was informed that a supply of electricity was now available in thirteen out of twenty-one parishes in the rural district of Grimsby, in twelve out of thirty-nine parishes in the rural district of Caistor, and in twenty-seven out of seventy-nine parishes in the rural district of Louth, and would be available shortly in one further parish in the rural district of Caistor and two further parishes in the rural district of Louth. If Col. Heneage could furnish him with evidence of a prospective demand in any particular area, he would have inquiries made as to the possibility of meeting it.

Non-Statutory Suppliers

On November 29th Sir S. Crooke asked the Minister of Transport whether he was aware that the McGowan Committee in its inquiry practically ignored the case of the non-statutory suppliers of electricity and that its recommendations, if adopted, would be in most cases destructive of any benefit from the enterprise, risk and hard work of these suppliers; if he would give the numbers of non-statutory suppliers and authorised suppliers, respectively; and whether, in any future legislation dealing with the recommendations of the McGowan Committee, he would ensure fair treatment for the non-statutory suppliers in question.

Captain A. Hudson said that the Electricity Commissioners had no complete information as to the number of non-statutory suppliers, who included numbers of persons owning small private plants. He could assure the hon. member that in any legislation which might be promoted to deal with the supply of electricity the position and just claims of non-statutory suppliers would be borne in mind.

Length of Loan Periods

FEELING that the periods attaching to loan sanctions of the Electricity Commissioners for meters, domestic apparatus and change-over work were inadequate the Poplar Electricity Committee recently recommended that other Metropolitan Borough Councils should be asked to support representations to the Commissioners. Instead of ten, seven and seven years respectively it was thought that the periods might reasonably be extended to twenty, twelve and twenty years. At St. Pancras, however, the chief electrical engineer and manager has informed the Finance Committee that he is not in agreement with the suggested extension, and with this the Committee concurs. The Fulham Finance Committee, having considered the observations of the borough electrical engineer and borough treasurer, is also unable to recommend the Council to give its support.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Equipment Trust, Ltd.—Private company. Registered in Dublin November 22nd. Capital, £1,000. Objects: To carry on the business of financiers for the sale for cash or on credit or on instalment plan of all classes of electrical equipment, kitchen and other cooking ranges and appliances, &c. The subscribers are: W. Barry, 115, Lower Bagot Street, Dublin, and M. J. Archer, 6, Glenbeigh Road, North Circular Road, Dublin.

R. A. Wilby & Co., Ltd.—Private company. Registered November 24th. Capital, £1,000. Objects: To carry on the business of manufacturers, importers, sellers, repairers and hirers of and dealers in radio and television apparatus and parts, electrical installations and appliances, &c. The subscribers are: R. A. Wilby, 91a, High Road, East, Felixstowe, radio engineer, James A. Wilby, 43, Humber Doucy Lane, Ipswich, caravan builder. Solicitors: Block & Cullingham, Arcade Chambers, Ipswich.

H. & C. Electric Lamps, Ltd.—Private company. Registered November 23rd. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in electrical and quartz lamps, reflectors, bells, fires, stoves, cookers, &c. The subscribers are: B. A. Fox, C.A., 51, Highview Road, Ealing, W.13; and R. H. Goodrich, 17, Thornton Road, Potters Bar, Mdx. Secretary: B. A. Fox. Registered office: 123, Cannon Street, E.C.4.

E. Dawson (Lamp Factors), Ltd.—Private company. Registered November 22nd. Capital, £5,000. Objects: To acquire the business of wholesale electrical suppliers carried on by E. Dawson & Co. at 10, Gray's Inn Road, W.C. The permanent directors are: W. E. Pott (chairman), Woodbury Common Road, Lingfield, Surrey; and W. Taylor, 25, Monkhams Drive, Woodford Green, Essex. Registered office: 10, Gray's Inn Road, W.C.1.

W. O. Honor, Ltd.—Private company. Registered November 21st. Capital, £1,000. Objects: To acquire the business of electrical contractor and engineer carried on by W. O. Honor at 48-50, George Street, Hull. The directors are: W. O. Honor (permanent governing director and chairman), and F. I. Honor, both of 38, The Link, Anlaby Park, Hull. Registered office: 48-50, George Street, Hull.

Baldwin Electro-Medical, Ltd.—Private company. Registered November 21st. Capital, £100. Objects: To carry on the business of manufacturers, factors or vendors of mechanical, electrical, optical and other scientific appliances and equipment of all kinds, including electro-medical apparatus of every description, &c. The directors are: R. J. Falk, 8, Shepherd's House, Shepherd's Market, W.1; A. Love, Brooklands House, Dartford; and L. L. Whyte, 9, Stafford Mansions, Stafford Place, W.1; and such other persons as shall be appointed by them. Registered office: 10, Old Jewry, E.C.2.

Returns of Electrical Companies

Statements of Capital

Young Accumulator Co., Ltd.—Capital, £225,000 in 2,250,000 ordinary shares of 2s. Return dated July 11th, 1938. 1,934,792 shares taken up. £162,530 17s. 4d. paid on 1,625,308 ⅔ shares. £30,948 6s. 8d. considered as paid on 309,483 ⅓ shares. Mortgages and charges, £11,000.

W. Mackie and Co., Ltd.—Capital, £12,000 in £1 shares. Return dated October 13th, 1938. 7,500 shares taken up. £3,155 paid. £4,345 considered as paid. Mortgages and charges, nil.

C. F. Casella Co., Ltd.—Capital, £17,000 in 2,000 preference and 15,000 ordinary shares of £1. Return dated November 4th, 1938. 2,000 preference and 12,204 ordinary shares taken up. £3,504 paid. £10,700 considered as paid. Mortgages and charges, nil.

Mortgages and Charges

English Electric Co., Ltd.—Satisfaction to the extent of £21,000 on November 15th, 1938, of 4 per cent. debenture stock secured under trust deed dated May 7th, 1936, and registered May 12th, 1936. (According to the register of mortgages, the trust deed registered May 12th, 1936, originally secured £1,250,000 debenture stock.)

Durham Cables, Ltd.—Mortgage debenture charged on deeds and documents relating to leasehold premises at Birtley, Durham, and the company's undertaking and other property, present and future, including uncalled capital, dated November 10th, 1938, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

L. Adams, Ltd.—Mortgage debenture charged on the company's undertaking and property, including uncalled capital, dated November 14th, 1938, to secure £2,000. Holders: Peoples Bank, Ltd., Bentinck Buildings, Wheeler Gate, Nottingham.

Exseller Manufacturing Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated November 9th, 1938, to secure £300. Holder: Mrs. M. C. Rawson, Flat 25, Grove Hall Court, St. John's Wood, N.W.8.

Winstanley & Lambert, Ltd.—Satisfaction to the extent of £200 on October 29th, 1938, of mortgage registered February 27th, 1936. (According to the register of mortgages, the mortgage registered February 27th, 1936, originally secured £1,000.)

Reports and Dividends

Crompton Parkinson, Ltd., report a net profit for the year ended September 30th of £402,046, as compared with £403,864 in the preceding year, to which is added £70,546 brought in, making £472,592. It is proposed to place £106,419 to general reserve, £5,000 to the central benevolent fund, and to pay a final dividend on the ordinary and "A" ordinary shares of 9 per cent. actual, making 15 per cent. for the year (against 12½ per cent.), and to pay a special cash bonus of 9d. per share on the ordinary and "A" ordinary shares. The balance carried forward is £71,626. Following the annual meeting on December 16th an extraordinary meeting will be held at which resolutions will be submitted for increasing the capital of the company from £1,700,000 to £2,000,000 by the creation of a further 1,200,000 "A" ordinary shares of 5s. each, ranking in all respects *pari passu* with, and carrying the same rights in all respects as the existing "A" ordinary shares of the company. It is proposed to capitalise £409,814 of the reserve funds and to apply it in paying up in full 1,639,256 "A" ordinary shares of 5s. each to be distributed to the holders of ordinary and "A" ordinary shares at the rate of one new fully paid "A" ordinary share for every two ordinary and/or "A" ordinary shares held, the new shares to rank for dividend as from October 1st, 1938, and in other respects *pari passu* with the existing "A" ordinary shares of the company. The present authorised capital includes £850,000 of "A" ordinary 5s. shares, of which £669,628 have been issued.

Following the custom of previous years a copy of the speech to be made by Mr. Frank Parkinson (chairman and joint managing director) at the annual meeting has been issued with the report and accounts. In this Mr. Parkinson says that since the last meeting the political and business world has been subjected to a number of severe shocks, which have all tended to cause a decline in trading activity. National and international politics are having an increasingly important influence on trade and commerce, both at home and overseas. The company started the year under review well with a satisfactory order book, but during the year there was some contraction in the volume of orders secured. Having regard to the circumstances the company has every reason to be satisfied that its position has been so well maintained. In the present unsettled state of national and international affairs it would be foolish to pretend to foresee the future clearly. Nevertheless, he thinks there are sound reasons for regarding the future of the company with confidence. Among the more immediate reasons are the fact that it has started its new year with an order book little less than that of a year ago, and that it is receiving its full share of orders for plant and equipment in connection with the Government's defence programme. A deeper reason for confidence is that all sections of the business are now better organised and equipped for the manufacture of electrical plant and apparatus than ever before. Mr. Parkinson states that it is increasingly apparent that in addition to the armament effort that is required an even greater effort must be made to retain and expand overseas markets. In this respect the company has strengthened its sales forces in several countries. Its factories in Australia have experienced a successful year and its new factory in India is nearing completion. The challenge to its trade in overseas markets by foreign subsidised industries and collective methods of bartering calls for strenuous exertion on its part. In the working out of counter measures he believes that reliance should be placed upon the ability of industries to regulate themselves. The company's contribution to the superannuation funds of the parent company and its subsidiaries is larger than for any previous year. In addition, all its employés now qualify for full holidays with pay. Referring to the dividend and bonus policy, Mr. Parkinson says that the position now reached by the company necessitates a reconsideration of its distribution policy. They have now built up substantial liquid cash resources, and the necessity to conserve cash at the same rate as in the past no longer exists. The outlook to-day does not justify the expectation that profits will continue to expand as in the past. The directors have decided to recommend a new distribution policy which will involve a substantially larger cash disbursement than has been divided in the past. The dividend of 15 per cent. has been fixed at a rate which the board believes can conservatively be continued. It also hopes to supplement the annual cash dividend with a cash bonus as and when circumstances permit.

The British Electric Transformer Co., Ltd., reports a net profit for the year ended September 30th of £79,681, as compared with £79,599 in the preceding year, to which is added £1,750 brought in, making £80,431. It is proposed to pay a final ordinary dividend of 1s. per share, making 3s. 6d. per share tax free, for the year (same), and to carry forward £1,900. The report states that the volume of business obtained during the year for all classes of transformers has been maintained at a satisfactory level.

Electrical Switchgear & Associated Manufacturers, Ltd., held their annual meeting on November 27th, when Mr. J. A. Hirst (chairman), who presided, said that the operating company (Brookhirst Switchgear, Ltd.) increased its turnover during the year under review and showed a satisfactory profit. During this period development reached its peak, considerable rearrangement of plant and general layout was carried through, and many difficulties connected with these changes were overcome, while output was not only maintained but increased. The orders received during the financial year were naturally less than in the previous year, when they were abnormally high. They were, nevertheless, at a satisfactory level, and the flow had been maintained during the current year. Since the extensions programme for their ordinary business was em-

barked upon Brookhirst Switchgear had developed a new sideline—the manufacture of steel benches and furniture for factories, garages, and other uses which was being marketed under the name of "Steelpact," and the orders received led them to hope that it would prove a valuable addition to their business.

Newman Industries, Ltd.—Particulars were published on Wednesday last for information only relating to 100,000 6 per cent. redeemable cumulative preference shares of £1 each and 200,000 ordinary shares of 2s. each created by resolutions passed on June 27th. The 100,000 preference shares have been placed privately at par, 150,000 ordinary shares are offered to ordinary shareholders at 3s. per share on the basis of one for three held, and 20,000 ordinary are being subscribed by Nathan and Rosselli at the same price. A further 30,000 ordinary are being distributed as bonus to preferred ordinary shareholders. The proceeds of the issue will be applied in paying off a bank overdraft of £50,000 and for the expansion of the company's business.

The General Cable Manufacturing Co., Ltd., has announced a final dividend of 6 per cent., making 12 per cent. for the year (against 13 per cent.).

The British Power & Light Corporation, Ltd., proposes to increase its capital from £3,250,000 to £4,000,000 by the creation of 750,000 £1 shares. Of the new shares 600,000 will be 4½ per cent. cumulative preference shares. Meetings to consider the proposal were held on Wednesday last.

The North Metropolitan Electric Power Supply Co. is holding an extraordinary meeting on December 7th at which resolutions will be submitted for increasing the capital by the creation and issue of £1,000,000 4 per cent. cumulative preference stock, ranking *pari passu*, except as regards rate of dividend, with the existing 6 per cent. cumulative preference stock.

The Electrical Finance & Securities Co., Ltd., is issuing at 30s. each 100,000 £1 ordinary shares in the proportion of four for every eleven held. Lists will close on December 9th. Funds are required to repay a bank overdraft and to meet expenses of the company's expansion.

The Shropshire, Worcestershire & Staffordshire Electric Power Co. has announced interim dividends of 4 per cent., less tax, on the "A" ordinary and 2½ per cent., less tax, on the "B" ordinary shares.

Aron Electricity Meter, Ltd., has declared an interim dividend of 5 per cent., less tax (same).

The South Wales Electric Power Co. has announced an interim dividend of 2 per cent., less tax. No interim dividends have been paid previously, but for the whole of 1937 a dividend of 5 per cent. was paid.

The London Passenger Transport Board.—A private meeting of stockholders of the Board was held on November 24th, at which it was decided to form a representative committee of "C" stockholders.

The East African Power & Lighting Co., Ltd., is paying an interim dividend on the ordinary shares of 3 per cent. (same).

The Palestine Electric Corporation, Ltd., has declared an interim dividend of 2½ per cent., tax free, on the ordinary and "A" ordinary shares (same).

Tube Investments, Ltd., reports a net revenue of £867,257 for the year ended October 31st, as compared with £825,090 in the preceding year. The ordinary dividend for the year is maintained at 23¾ per cent., reserve receives £177,458, and £132,132 is carried forward (against £128,220 brought in).

Stocks and Shares

STOCK Exchange markets continue to pursue a jog-trot but somewhat uneven course. The labour troubles in France which threatened a national crisis made a new cause for depression in gilt-edged markets, which had been already overcast by the weakness of sterling as against the dollar rate. It is said, and probably correctly, that money is streaming into the United States from European countries, our own included, where the uncertainty which surrounds exchange rates appears to become greater rather than less.

The United States, however, does not appear to be greatly benefiting by the inflow of foreign money and the President's "pump-priming" policy. There has been a good deal of selling of their own securities by the American public. Travellers recently returned from New York and Washington tell of the improved conditions that now obtain in American industries, but it is agreed that prices of American stocks and shares have run ahead of the earnings of railroad, utility and commodity companies. The recent buoyancy of Americans has received something of a check.

In the markets for British industrial securities, the disposition is still for prices to sag. The constant inquiry for some adequate reason to explain the dryness of Stock Exchange markets remains unanswered. Considerable interest continues to be taken in the various questions that revolve around the London Passenger Transport Board. Gilt-edged issues derived strength from the statement of Sir John Simon that armament expenditure is to be met by a national loan. This was deemed to imply the Government's intention of imposing no new taxation next year.

Transport Matters

Lively controversy continues to roll round the position of London Transport Board "C" stockholders. Meetings of the larger holders have been held to discuss an application for the appointment of a receiver. The right arises, as is generally known, from the Board's failure to pay the standard 5½ per cent. dividend which was the stockholders' due this year. A representative organisation is said to be taking shape. At the centre of the controversy is the chairman of Thomas Tilling, which company is the largest individual holder. Mr. Heaton has declared in favour of the increase in fares for which the Board has already stated its intention to ask. He also puts forward the case for a change in the status of the "C" stock, whereby the existing rights would be given up in exchange for a fixed 4 per cent. dividend with a Government guarantee. Matters will evidently come to a head before long. Meanwhile, the price of the stock has firmed up to 78½.

Spirits have risen cautiously in the Home Railway market following the meeting between the Minister of Transport and the heads of the four companies. Optimism was encouraged further by the companies' well displayed "square deal" claims. The better feeling was later dashed, to some extent, by the decision of the L.M.S. to postpone consideration of the 5 per cent. preference dividend until the full accounts are available. This concrete reminder of present trouble knocked some of the stuffing out of hopes which still have little of substantial nature behind them. Substance, however, is not regarded as lacking in the companies' claims to be treated, so far as the carrying of merchandise is concerned, on all fours with their competitors. Prices of the stocks concerned show some irregularity. Southern preferred, for instance, is 10s. better, at 57½, while the 5 per cent. preference, at 92½, is a point down on the week.

Crompton Parkinson Dividend Policy

Profits earned by Crompton Parkinson in the difficult twelve months of trading ended in September were just about on a level with the previous figures. The manner of their distribution to shareholders is to be changed to meet altered circumstances. Taken together, the two announcements made a good impression. The price of the shares remains unchanged, however, at 27/6, cum 9 per cent. final dividend (making 15 per cent.), 15 per cent. cash bonus, and scrip bonus of 50 per cent. These distributions go against last year's 12½ per cent. dividend, no cash bonus, and 40½ per cent. share bonuses. From now onwards, the expansion of the business is expected to proceed at a more staid pace, with not the same urgency as before for conserving cash resources. Hence the change in dividend policy, which will now aim at steady 15 per cent. dividends on the enlarged capital, perhaps with cash bonuses added in good times. After the various deductions, the price of the shares is equivalent to about 17s. 6d., giving a yield of £4 6s. per cent. on a 15 per cent. dividend. Evidently the chance of extra cash payments from time to time is not left out of the reckoning.

Edmundsons

The 2½ per cent. interim dividend declared by Edmundsons Electricity Corporation is payable on an ordinary capital of £6,750,000, which is about 80 per cent. more than the amount ranking for last year's interim of 4 per cent. Capital has been increased this year first by the issue of 750,000 new shares, at 30s., in January; and again by the free bonus of 50 per cent. distributed in June. The last final dividend made a total of 9 per cent. for 1937-8 on the old capital. Scaled down in accordance with the scrip bonus, it would represent 6 per cent. on the present shares. This is the rate generally expected for 1938-9, and would give a yield of £4 12s. 3d. per cent. with the shares at 26s.

Price Movements

On balance, the lists of share prices in various parts of the Stock Exchange have not seriously been disturbed during the week. Government stocks have taken the same road as sterling, but the weakness has not been pronounced enough to affect materially such stocks as the Central Electricity Board issues. Industrial markets are tolerably steady: among electrical equipment shares a point of interest is the recovery in Brush stock, to 5s. A meeting is to be held on December 20th to authorise the increase in capital rendered necessary by the deal with Petters. Electricity supply shares are becalmed in both the home and foreign sections. Cable and Wireless stocks relapsed under the disappointing October traffic index, the ordinary and preference both shedding 3 points. Oriental Telephones, at 2⅝, are another dull spot in the communications group.

New Issues

Prospectuses relating to new issues are making their appearances with more frequency. In general, the stock offered is of the well-secured fixed-interest variety. Confidence has not thawed sufficiently, so far, to encourage promoters to chance their hand in the speculative sphere. Where the relation between price and security has been deemed reasonable, the volume of uninvested money has shown itself to be glad of a fresh outlet. In the case of the new London Power 3½ per cent. debentures 1952-72, however, the offered price of 98½ was apparently pitched too high to be popular. Public subscriptions covered little more than a quarter of the issue, and the price opened at a discount of 1½ points. The existing 5 per cent. stock has hardened to 106. British Power & Light is proposing an increase of capital in the shape of preference shares. Electrical Finance and Securities have issued new shares, on a four in eleven basis, at 30s. Dealings began at 16s. premium. The old shares are quoted at 47s. 6d., ex-rights to the issue.

Electrical Companies' Shares

Prices, dividends and yields

Company.	1938. High-est.	1938. Low-est.	Dividend. Pre-vious.	Dividend. Last.	Price Nov. 29.	Rise or Fall.	Yield p.c. £ s. d.
Home Electricity Companies.							
Bournemouth and Poole ...	68/3	62/–	15	15	67/6	—	4 8 7
British Power & Light ...	30/9	24/6	6	7	28/6	—	4 18 3
City of London	34/6	28/6	7½	7½	32/–	+6d.	4 13 9
Clyde Valley	42/6	33/–	8	8	36/3	—	4 8 2
County of London ...	51/9	38/9	10½	10½	47/–	—	4 9 5
Edmundson's:							
7% Pref....	33/3	30/–	7	7	31/3	—	4 9 6
Ord.	40/9	18/9	9	9	26/–	—	—
Elec. Dis. Yorkshire ...	43/6	37/9	9	9	41/3	—	4 7 5
Elec. Fin. and Securities...	51/9	49/–	12½	12½	47/6xd.	—	5 5 3
Elec. Supply Corporation...	55/–	50/–	12	12	52/6	—	4 11 5
Isle of Thanet	21/3	18/6	4	4	20/–	—	4 0 0
Lancs Light and Power ...	35/–	26/–	7½	7½	31/3	—	4 16 0
Llanelly Elec.	23/6	21/–	5½	5½	21/6	—	5 2 4
Lond. Assoc. Electric ...	32/9	28/–	7	7	30/9	—	4 11 4
London Electric	36/3	32/–	8	10	34/–	—	4 2 4
London Power Deb. Red.	108⅝	100	5	5	106	+1	4 14 6
Metropolitan	51/–	41/–	10	12	48/3	—	4 19 7
Midland Counties	39/9	33/–	8	8	36/3	—	4 4 3
Mid. Elec. Power	41/9	37/–	8	9	40/–	—	4 10 0
Newcastle Elec.	31/9	27/6	7	7	28/9	—	4 17 4
North Eastern Electric:							
Ordinary...	34/–	25/–	7	7	31/–	—	4 10 6
7% Pref....	34/–	30/–	7	7	32/6	+6d.	4 6 2
Northampton	47/6	43/9	10	10	46/3	—	4 6 7
Notting Hill 6% Pref. (£10)	14½	13½	6	6	14	−½	4 2 9
North Met. Elec.:							
Ordinary...	49/–	43/–	10	10	46/3	—	4 6 7
6% Pref....	30/6	28/3	6	6	29/6	—	4 1 4
Richmond Elec.	30/6	28/–	7	7	28/9	—	4 17 5
Scottish Power	38/9	32/–	8	8	35/9	−6d.	4 9 6
Southern Areas	22/9	18/6	4½	5	21/3	—	4 14 1
South London	32/6	31/–	7	7	31/6	—	4 9 0
West Devon	23/3	21/3	5	5	1½	—	4 9 0
West Glos.	19/–	16/9	2	2	19/–	—	2 2 1
Yorkshire Elec.	42/–	36/9	8	8	40/–	—	4 0 0
Overseas Electricity Companies.							
Atlas Elec.	4/6	2/6	Nil	Nil	3/–	—	—
Calcutta Elec.	44/3	36/3	12*	10*	2	—	5 0 0
Cawnpore Elec.	40/–	35/–	10	10	36/3	—	5 10 6
East African Power ...	28/3	22/6	7	7	23/6	—	5 19 2
Jerusalem Elec.	26/9	23/3	5	6	24/–	—	5 0 0
Kalgoorlie (10/–)	12/–	9/6	7½	7½	10/3	—	7 6 4
Madras	34/6	28/9	8*	8*	30/–	—	5 6 8
Montreal Power	31⅝	26⅛	1½	1½	32½	—	—
Palestine Elec. "A" ...	31/9	27/–	7½*	7½*	30/–	—	5 0 0
Perak Hydro-electric ...	25/3	17/–	7	6	18/9	—	6 8 1
Shawinigan Power ...	23½	16½	65cts.	85cts.	22	—	—
Tokyo Elec. 6%	65½	39	6	6	57½	—	10 8 8
Victoria Falls Power ...	76/3	55/–	12	13½	70/–	—	3 17 2
Whitehall Investments Pref.	22/3	15/–	7½	7½	17/6	—	8 11 6
Public Boards.							
Central Electricity:							
1950–70	115⅜	97	5	5	110½	—	4 10 6
1955–75	118½	100	5	5	113½	—	4 8 1
1951–73	111	95	4½	4½	108½	—	4 3 0
1963–93	101	85	3½	3½	95½	−1	3 13 4
London Elec. Trans. Gtd.	93½	88	2½	2½	90½	—	2 15 3
London & Home Counties,							
1955–75	112⅜	97½	4½	4½	110	—	4 1 10
Lond. Passenger Transport:							
A	119½	104⅜	4½	4½	109½	−1	4 2 2
B	122⅜	105	5	5	113½	—	4 8 1
C	84	68	4½	4	78½	+½	5 2 0
West Midlands Joint Elec.,							
1948–68	115¼	102½	5	5	113	—	4 8 6
Telegraph and Telephone.							
American Tel. & Tel. ...	154½	114	9	9	158½	+1	5 13 7
Anglo-Am. Tel.:							
Pref.	115½	100½	6	6	100½	—	5 19 5
Def.	28	23	1½	1½	23	—	6 10 5
Anglo-Portuguese	23/6	19/3	8	8	21/3	—	7 10 7
Cable & Wireless:							
5½% Pref.	104	84	4½	5½	83	−3	6 12 6
Ord.	67⅜	36	—	4	38	−3	10 8 0
Income	102½	99	—	—	101	—	3 18 2
Canadian Marconi $1 ...	6/6	3/9	—	Nil	5/–	—	—
Globe Tel. & Tel.:							
Ord.	32/6	27/6	5½*	7½*	27/6	—	5 9 1
Pref.	27/6	23/9	6	6	26/3	—	4 11 5
Great Northern Tel. (£10)...	42½	34	20	20	39	—	5 2 2
Marconi-Marine	30/6	21/6	10	7½	23/9	—	6 6 4
Oriental Telephone Ord. ...	59/3	2½	12*	12*	2⅜	−⅛	4 11 3
Radio Corpn.	9½	4⅜	8	6	8½	—	—
Telephone Props	13/9	11/3	5	6	13/3	—	9 1 2
Telephone Rentals (5/–) ...	10/–	7/6	5	6	9/3	—	3 4 10
Western Union	34½	17	2⅜	—	26½	−3	—
Traction and Transport.							
Anglo-Arg. Trams:							
First Pref.	11/–	2/6	Nil	Nil	5/–	—	—
4% Inc.	31	8	Nil	Nil	9	—	—
British Electric Traction:							
Def. Ord.	1060	675	5	5	925	−25	—
Pref. Ord.	175	150	8	8	165	—	4 17 0
Bristol Trams	45/–	34/3	5	8	2	—	4 0 0
Brazil Traction	14½	7⅛	70cts.	$1	11⅜	−⅜	—
Calcutta Trams	26/9	21/6	8	8	24/–	+6d.	6 13
Cape Elec. Trams	18/6	15/6	5	6	17/6	—	6 17 2
Lancs Transport	35/3	29/3	10	10	35/–	—	5 14 3
Mexican Light:							
1st Bonds	39	16½	5	5	25	—	—
Rio 5% Bonds	91	47	5	5	60	—	8 6 8
Southern Rly:							
5% Prefd.	87	48	5	—	57½	+½	—
5% Pref.... ...	116	83	5	5	92⅛	−1	5 8 0
T. Tilling	60/–	36/6	10	10	43/3	−6d.	4 12 7
Tilling & B.A.	57/–	46/–	6	10	50/–	—	4 0 0
West Riding	46/3	30/6	10	10	33/9	+6d.	—
Equipment and Manufacturing.							
Aron Electricity Ord. ...	40/3	31/–	15	15	1 1/16	—	8 17 6
Assoc. Elec.:							
Ord.	45/3	32/–	10	10	39/–	—	5 2 8
Pref.	38/9	35/6	8	8	36/6	—	4 7 8
Automatic Telephone & El.	43/–	35/–	5	10	41/3	—	4 17 1
Babcock & Wilcox ...	44/–	32/6	10	10	37/6	—	5 6 8
British Aluminium Ord. ...	54/–	40/–	10	12½	54/6	−6d.	4 11 9
British Insulated Ord. ...	95/9	77/–	20	20	4⅜	−1/16	4 11 4
British Thermostat (5/–)...	16/–	9/–	17½	18½	15/9	−6d.	5 17 6
British Vacuum Cleaner ...	35/9	27/6	5	6	28/3	—	4 5 0
Brush Ord.	5/6	4/9	Nil	Nil	5/–	+3d.	—
Callender's	5½	78/6	20	20	4⅛	−1/16	4 16 8
Chloride Elec. Storage ...	77/9	61/–	15	20	77/6	—	5 3 1
Consolidated Signal ...	116/–	75/–	30	36½	4⅞	—	7 9 7
Crabtree (10/–)	29/–	22/–	17½	17½	24/6	—	7 2 10
Crompton Parkinson:							
Ord. (5/–)	32/3	18/9	12½	15	27/6	—	—
E. K. Cole (5/–)	8/9	4/6	5	10	6/6	—	7 13 10
Elec. & Musical Industries							
(10/–)	16/3	9/–	10	5	11/9	—	4 5 0
Electric Construction ...	36/–	31/–	10	12½	32/6	—	7 13 10
Enfield Cable Ord. ...	5⅜	46/–	25	25	2⅜	—	—
Electrical Switchgear (10/–)	27/–	22/6	16	16	25/9	—	6 4 4
English Electric	33/–	24/6	Nil	10	33/–	—	6 1 3
Ensign Lamps (5/–) ...	14/3	11/3	—	25	14/0	—	8 18 6
Ericsson Tel.	2 3/16	31/–	25*	25*	2 1/16	—	3 0 6
Ever Ready (5/–)	26/3	16/6	45	35	21/–	—	8 6 8
Falk Stadelmann	34/3	27/–	10	10	27/6	—	7 5 6
Ferranti Pref.	27/6	25/6	7	7	27/6	—	5 2 0
G.E.C.:							
Pref.	34/–	31/3	6½	6½	31/3	—	4 3 2
Ord.	79/3	67/–	17½	20	78/–	—	5 2 7
Greenwood & Batley ...	27/6	19/–	7	15	27/6	—	10 19 0
Hall Telephone (10/–) ...	24/6	18/3	5	15	21/3	+6d.	7 1 2
Henley's (5/–)	21/–	16/–	15	20	20/–	—	5 0 0
4½% Pref.	23/–	22/–	4½	4½	22/6	—	4 0 0
Hopkinsons	40/–	32/6	10	12½	39/6	−6d.	5 6 7
India-Rubber Pref. ...	21/9	20/3	5½	5½	21/3	—	5 3 6
Intl. Combustion	5½	4½	5	30	5½	—	5 9 0
Ismay Industries (5/–) ...	6/9	1/–	6	6	1/3	—	—
J. Lucas	57/9	47/6	15	15	56/3	—	5 6 9
Johnson & Phillips ...	43/9	32/6	10	12½	36/3	—	6 13 4
Lancashire Dynamo ...	72/3	53/–	20	25	66/3	—	7 11 0
Laurence Scott (5/–) ...	12/–	9/–	7	15	12/–	—	6 5 0
London Elec. Wire ...	35/–	28/3	12	7½	29/6	—	5 1 8
Mather & Platt	49/–	41/3	12	13½	45/3	−6d.	5 13 0
Metropolitan Elec. Cable Pf.	22/–	21/–	5½	5½	21/3	—	5 3 6
Murex	93/9	66/3	20	20	78/9	−1/16	5 2 0
Pye Deferred (5/–) ...	12/–	8/–	5	25	9/6	—	13 3 2
Revo (10/–)	36/3	30/–	12	17½	35/–	—	5 0 0
Reyrolle	62/6	49/–	12½	12½	55/9	−6d.	4 10 0
Siemens Ord.	31/–	20/6	7½	7½	24/6	—	6 2 4
Strand Elec. (5/–) ...	6/–	4/–	5	10	5/–	—	10 0 0
S. Smith (1/–)	9/9	6/3	37½	50	8/9	—	6 6 0
Switchgear & Cowans (5/–)	19/6	12/6	20	20	15/–	—	6 13 4
Telegraph Condenser (10/–)	18/9	12/–	5	5	12/6	—	4 0 0
Telegraph Construction ...	2½	36/–	7½	10	2½	—	4 14 1
Telephone Mfg. (5/–) ...	9/9	7/–	9	9	8/9	—	5 2 10
Tube Investments... ...	89/6	70/–	23¾	23¾	4½	—	5 15 6
Vactric (5/–)	9/9	5/9	10	10	5/–	—	10 0 0
Vickers (10/–)	27/–	17/6	10	10	24/–	—	4 3 4
Westinghouse Brake ...	63/9	45/–	15	17½	56/–	−2/–	6 5 0
Walsall Conduits (4/–) ...	26/–	22/6	—	55	24/9	—	8 19 0
West, Allen (5/–)	6/3	4/6	—	7½	6/3	—	6 0 0

* Dividends are paid free of Income Tax.

New Patents

Electrical specifications recently published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1937

2607. "Method and apparatus for electrically measuring the thermal conductivity of gases." United States Fire Protection Corporation. January 31st, 1936. (494754.)

2813. "Variable electric circuit elements." Steatit-Magnesia Akt.-Ges. January 31st, 1936. (494896.)

2817. "Electro-magnetic resonators for use in radio or like apparatus." J. Pintsch Akt.-Ges. January 31st, 1936. (494857.)

5861. "Electron-discharge amplifiers." British Thomson-Houston Co., Ltd. February 26th, 1936. (494757.)

6053. "Electro-magnetic deflecting coils for cathode-ray tubes." Marconi's Wireless Telegraph Co., Ltd. February 28th, 1936. (495016.)

6082. "Transmission and reception of electro-magnetic waves." O. Bormann. March 25th, 1936. (495835.)

6495. "Ultra-short wave transmitting and receiving devices." O. Bormann. March 13th, 1936. (495019.)

8861/2. "Electrical musical instruments." J. Compton Organ Co., Ltd., and L. E. A. Bourn. March 25th, 1937 (Cognate application 12350/38). (494758/9.)

9188. "Electric control for electric motors, steam engines, and other prime movers." British Thomson-Houston Co., Ltd., H. W. C. Liddiard and T. H. Petch, junr. March 31st, 1937. (494900.)

9292. "Road traffic control systems." Siemens and General Electric Railway Signal Co., Ltd., J. D. Noble and H. J. N. Riddle. April 1st, 1937 (Addition to 410167). (494903.)

12427. "Electric cables." Allgemeine Elektricitats-Ges. May 12th, 1936. (494948.)

12476. "Cathode-ray apparatus." British Thomson-Houston Co., Ltd., and D. J. Mynall. May 1st, 1937. (494839.)

12531. "Electric lamps." W. C. Fairweather (Singer Mfg. Co.). May 3rd, 1937. (494957.)

12538. "Regulation of dynamos." J. Lucas, Ltd., and J. A. Laird. May 3rd, 1937. (484959.)

12569. "Treatment of metals in electrically heated salt baths." A. E. Bellis. May 23rd, 1936. (494842.)

12625. "Television and like apparatus." Fernseh Akt.-Ges. May 2nd, 1936. (494967.)

12667. "Dynamo regulators." J. Lucas, Ltd., and J. A. Laird. May 4th, 1937. (495030.)

12708. "Electric conductor cables." Standard Telephones and Cables, Ltd., and T. R. Scott. May 4th, 1937. (495034.)

12720. "Systems of electric motor control." British Thomson-Houston Co., Ltd. May 6th, 1936. (494771.)

12723. "Illuminating systems for optical-projection apparatus." British Thomson-Houston Co., Ltd., and S. R. Eade. May 4th, 1937. (495035.)

12805. "Radio and like receiving apparatus." C. Metcalfe. May 5th, 1937. (495066.)

12814. "Electric water-heaters." G. T. Church. May 5th, 1937. (494970.)

12852. "Cathodes for high-pressure metal-vapour electric-discharge lamps." General Electric Co., Ltd., V. J. Francis, J. W. Ryde and M. Pirani. May 5th, 1937. (495078.)

12869. "Electric testing apparatus for testing electric lamps and for other electrical devices." Marks and Spencer, Ltd., and C. W. J. Glegg-Butt. May 5th, 1937. (495042.)

12927. "Electric plug-and-socket connection devices." W. Nairn. May 6th, 1937. (495046.)

12955. "Manufacture of alternating electric current rectifiers." R. H. Cubitt and Westinghouse Brake and Signal Co., Ltd. May 6th, 1937. (495049.)

13049. "Electric storage batteries." J. Lucas, Ltd., and G. D. Spencer. May 7th, 1937. (495054.)

13100. "Electric systems for giving air-raid warnings." Standard Telephones and Cables, Ltd., and E. A. H. Bowsher. May 7th, 1937. (495057.)

13103. "Electric communication cables." Standard Telephones and Cables, Ltd., and A. G. Smith. May 7th, 1937. (495059.)

13104. "Electric remote indicating systems." Standard Telephones and Cables, Ltd., A. Brown and E. E. M. Woodward. May 7th, 1937. (495060.)

14704. "Method of manufacturing coils ready for use in electrical apparatus, more particularly for dynamo and transformers." H. Bohli. May 27th, 1936. (494777.)

15807. "Radio-frequency receiving systems." F. R. W. Strafford and Belling & Lee, Ltd. June 8th, 1937. (494979.)

18689. "Bearings for supports for small rotating parts, such as the rotors of electricity meters." N. Wright and Metropolitan-Vickers Electrical Co., Ltd. July 5th, 1937. (494782.)

22669. "Electric-discharge tubes." General Electric Co., Ltd. (Patent Treuhand-Ges. für Elektrische Glühlampen). August 18th, 1937. (494787.)

24813. "Electrically driven screw fans." Axia Fans, Ltd., and J. C. Akester. September 11th, 1937. (494987.)

26211. "Electron-discharge devices." Electrical Research Products, Inc. October 10th, 1936. (494791.)

28222. "Receiving device for an electric remote control system." Landis & Gyr Akt-Ges. December 24th, 1936. (494792.)

29964. "Potentiometer." J. G. Deakin. November 19th, 1937. (494797.)

32221. "Coil arrangements for electric traffic-counting apparatus and the like." Telefonaktiebolaget L. M. Ericsson. February 6th, 1937. (494995.)

33558. "Antenna network particularly applicable to systems for radio guiding of moving vehicles." Standard Telephones & Cables, Ltd. December 31st, 1936. (494801.)

1938

2809. "Electron-discharge device." Standard Telephones & Cables, Ltd. March 15th, 1937. (494803.)

2838. "Method of manufacture of metal sheathed electric heating tubes and of metal-sheathed electric conductors." Métallurgie du Nickel. December 10th, 1937. (494804.)

4923. "Detachable electrical indicating instruments." Westinghouse Electric & Mfg. Co. March 20th, 1937. (494808.)

5413. "Electric battery lamps." Elektrotechnische Fabrik Schmidt & Co. Ges. February 26th, 1937. (494810.)

5760. "Electro-mechanical apparatus for the operation of railway switches." E. Pacilli. February 23rd, 1937. (495003.)

6047. "Means for the electrical transmission to a distance of movements of at least one control member to at least one controlled member." E. Huber. February 26th, 1937. (Cognate application 6048/38.) (494813.)

6461. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. March 13th, 1937. (494814.)

6780. "Current collectors for electric vehicles." Westinghouse Electric & Mfg. Co. March 20th, 1937. (495005.)

7887. "Flash-lamps." British Thomson-Houston Co., Ltd. March 13th, 1937. (495007.)

8526. "Electrical oscillation generators." Marconi's Wireless Telegraph Co., Ltd. March 20th, 1937. (494884.)

8685. "Electric oscillating devices having a piezo-electric crystal suspended in a bulb." Fabrica Italiana Magneti Marelli. March 22nd, 1937. (495009.)

9896. "Electric thickness gauges." British Thomson-Houston Co., Ltd. April 1st, 1937. (494886.)

10243. "Controlling device for battery-charging apparatus." Aktiebolaget Latex and S. D. Vigren. April 2nd, 1937. (494821.)

10859. "Radio transmitting arrangements particularly for direction-finding systems." C. Lorenz Akt-Ges. April 16th, 1937. (494822.)

12871. "Arrangements for automatically controlling the volume in radio receivers." Aga-Baltic Radio Aktiebolag. April 30th, 1937. (494939.)

13708. "Light sources comprising electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 10th, 1937. (494827.)

14569. "Electric switch contacts." British Thomson-Houston Co., Ltd. May 15th, 1937. (494829.)

20309. "Electric high-pressure metal vapour discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 20th, 1937. (494832.)

Trade Mark Applications

The following are among the recent applications for British trade marks applications. Objections against any of the proposed marks may be entered within one month from November 23rd :—

Mei (lettering and design). No. 576503. Class 13 (III). Fittings and standards for electric lamps, &c.—Eusen Ising, Bergneustadt, Germany (British representatives, Marks & Clerk, 57-58, Lincoln's Fields, W.C.2).

Autovox. No. 600081. Class 9 (IV). Radio-telephonic and telegraphic receiving sets.—Arvin Electric Co., Ltd., Shropshire House, 179, Tottenham Court Road, W.1.

Dilen. No. 600652. Class 11 (IV). Lanterns made wholly or partly of ordinary metal and employing reflectors and refractors to give distribution to light from electric lamps.—British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.

New Street Lighting at Hammersmith

FOLLOWING the installation of mercury vapour electric-discharge lamps in Goldhawk Road and Westway, Hammersmith, the lighting of other main thoroughfares in the borough is to be carried out on similar lines. The columns will be of steel and of the most modern design embodying several novel features. The new installation has just been commenced, and will eventually consist of some 550 units. G.E.C. "Di-fractor" lanterns with the necessary equipment will be used to house the "Osira" lamps. Where trolley-buses are in operation the traction poles are being utilised for accommodating the new side-entry fixing lighting units, which have been specially designed to withstand the vibrations set up by trolley-buses. They will be suspended from special brackets clamped to the poles. In certain other roads and at special positions, new type G.E.C. steel columns will be installed. In the most important roads 400-W lamps will be used and in the secondary roads the 250-W size will be employed. The layout scheme is to be based on the recommendations of the M.O.T. Report, with modifications necessitated by the existing traction pole positions. Where these are unsuitable new columns will be utilised. The installation, which will extend over eight to ten miles, has been designed by Mr. D. F. Barton, the borough engineer and surveyor, in collaboration with G.E.C. engineers so far as siting and positioning of the poles are concerned. The area taken in by the new scheme will include Hammersmith Road, Hammersmith Broadway, King Street, Scrubbs and Wood Lane, Hammersmith Bridge Road and other important thoroughfares. The lighting in Fulham Palace Road will link up with that in Fulham, and thus there will be a continuous stretch of "Osira" lighting from Putney Bridge to Harrow Road.

Contract Information

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Aberdeen.—December 13th. County Council. Electrical work at houses at Strichen. County Clerk.

Electrical work at houses at Longside. County Clerk, 22, Union Terrace.

Corporation. Electrical and heating work at Sunnybank school extensions. Schedules from J. A. Ogg Allen, 73a-79a, Union Street.

Australia.—BRISBANE.—December 17th. Charleville Electricity Undertaking. Two motor generator sets complete with all accessories. (T.Y. 29025/1938.)*

VICTORIA.—January 17th. State Electricity Commission. Outdoor switchgear and accessories. (T. 29228/38.)*

MELBOURNE.—January 3rd. Posts and Telegraph Department. Rubber-insulated, braided, distributing wire. (T. 29245/38.)*

Barnstaple.—December 11th. Education Committee. Complete installation of electric lighting, power points and fittings in new senior boys' school. (See this issue.)

Birmingham.—December 14th. Electric Supply Committee. Transformer and switch oils. (November 25th.)

Bootle.—December 23rd. Borough Council. Sodium electric lighting in Southport Road. (See this issue.)

Burnley.—December 15th. Electricity Department. Two 400-kVA transformers. (See this issue.)

Cannock.—December 17th. Electricity Department. Medium and extra-high-voltage, paper-insulated, lead-covered and armoured cables, rubber-insulated cables, and single-phase prepayment meters for twelve months. (November 25th.)

Canterbury.—December 15th. Kent County Council. Electrical installations in new convalescent villas at the County Mental Hospital, Chartham Down. (November 25th.)

Chile.—SANTIAGO.—December 27th. State Railways Administration. Materials for electric lighting and power services, including bare and insulated copper wire, underground cable, flexible copper cable, insulating tape, insulating varnish, ebonite, sockets, fuses, branch boxes, metal filament lamps, lampholders, electricity meters, marble switchboards and metal tubing. (T. 28787/38.)*

Cleethorpes.—December 30th. Electricity Department. High-voltage switchgear and one electric van. (See this issue.)

East Retford.—December 19th. Electricity Department. Three steel kiosks. (See this issue.)

Eastbourne.—January 10th. Electricity Department. Stores and materials for twelve months; wiring for hired and hire-purchase apparatus and for assisted wiring installations. (See this issue.)

Edinburgh.—December 9th. Corporation. Rewiring the electrical installation at the mortuary and wards at Colinton Mains Hospital. Town Clerk.

Fife.—December 5th. County Council. Electric lighting at Lower Largo housing estate (twenty-two houses). County Clerk, County Buildings, Cupar (deposit £1 1s.).

December 12th. Electric lighting at Colinsburgh housing estate (twenty houses). County Clerk (deposit £1 1s.).

December 19th. Electric lighting at Freuchie (twenty houses), and Kingskettle (twenty houses and police house) estates. County Clerk (deposit £1 1s.).

Hazel Grove and Bramhall.—December 7th. Electricity Department. One 250-kVA and two 150-kVA transformers. (November 18th.)

Heston and Isleworth.—December 12th. Electricity Department. Sheet-steel kiosk, extra-high-voltage switch-truck and 600-kVA transformer. (See this issue.)

Horsham.—January 9th. Electricity Department. High-voltage main switchboard. (November 28th.)

India.—CAWNPORE.—January 2nd. Municipal Board. Electrically operated flocculators and sludge-collecting mechanism (deposit £2 2s.). Electrical pumping machinery for the unfiltered water pumping station at Bhairon Ghat (deposit £2 2s.). Electrical pumping machinery for the filtered water pumping station at Benajhabar. Williams, Temple & Bartholomew, consulting engineers, 28, Victoria Street, Westminster, S.W.1 (deposit £2 2s.).

CALCUTTA.—December 6th. Indian Stores Department. Eighty train lighting sets. (T.Y. 28872/1938.)*

CEYLON.—March 31st. Crown Agents for the Colonies. Various works, including electrical plant, for the Ceylon Hydro-Electric Scheme. (See this issue.)

Kent.—December 15th. County Council. Electrical work at the County Hospital, Dartford, the County Hospital, Pembury, and the Sunbridge Institution. (November 25th.)

Liverpool.—December 12th. Electric Supply Department. Eighteen 750-kVA step-down transformers. (November 25th.)

Loanhead.—December 6th. Town Council. Electrical works at Hunter Avenue housing estate (sixty-two houses). Town Clerk.

London.—H.M. OFFICE OF WORKS.—December 13th. Installation of electrical wiring at Brackla Hill site, Bridgend R.O.F.: Installation of lightning protection system at Bishopton R.O.F. (See this issue.)

METROPOLITAN WATER BOARD.—December 29th. One set of electrically driven centrifugal pumps. (November 25th.)

ISLINGTON.—January 11th. Borough Council. Electrical and engineers' stores for twelve months. (See this issue.)

Macclesfield.—December 3rd. Visiting Committee. Electrical installation in connection with the extensions at the Parkside Mental Hospital. F. Anstead Browne, county architect, The Castle, Chester (deposit £10).

Manchester.—December 5th. Electricity Department. Mercury-arc rectifier equipment and outdoor-type sub-station kiosks and switchgear. (November 25th.)

New Zealand.—WELLINGTON.—February 14th. Public Works Department. Remote control, supervisory and recording equipment. (T. 28512/38.)*

February 14th. 11,000-V metal-clad switchgear and accessories for Invercargill sub-station. (T. 28803/38.)* Post insulator units and adaptors. (T. 28802/38.)* One electric travelling crane. (T. 28799/38.)*

February 14th, 21st and 28th. Transformer banks and spares (six separate contracts). (T.Y. 28801/38.)*

December 15th. Posts and Telegraph Department. Twelve 5,000-V DC fixed mica condensers. (T. 28503/1938.)*

February 9th. 200 miles of tinned copper wire. (T. 28798/38.)*

March 7th. One 11,000-V outdoor type oil circuit-breaker. (T. 29017/38.)*

January 31st. 620-ft. of 11-kV single-core cable and six cable end sealing boxes. (T.Y. 29244/38.)*

February 21st. Cable, and cable-end sealing boxes. (T. 29241/38.)*

January 25th. 500, 250 and 400 junction blocks with covers. (T. 29237/1938.)*

January 26th. Twenty-four battery testing sets. (T. 29380/38.)*

DUNEDIN.—January 9th. Electric Power and Light Department. Five 6,600-V circuit-breakers. (T.Y. 29232/38.)*

Oldham.—December 20th. Electricity Committee. Cast-iron frames and covers and earthenware conduit for twelve months. (See this issue.)

Repton.—December 16th. R.D.C. Automatic electrically operated pumping plant for the new sewage pumping station at Bretby. Consulting engineers, Wilcox, Raikes and Marshall, 33, Great Charles Street, Birmingham (deposit £2 2s.).

Ruthin.—December 20th. Denbighshire County Council. Installation of electric lighting and intercommunication telephones, &c., at the County Offices extensions. Clerk of the County Council, County Offices (deposit £5).

South Africa.—PRETORIA.—Union Tender and Supplies Board. December 8th. Electrical conduit fittings including bends, tees, couplings, boxes, bushes, saddles and backnuts. (T. 28924/1938.)*

December 8th. Stoves of all kinds, spares and parts for twelve months. (T. 28922/38.)*

JOHANNESBURG.—December 8th. Public Works Department. Air conditioning plant. (T. 28925/38.)*

January 5th. Railways and Harbours Administration. Train lamps and fittings for twelve months. (T. 29064/38.)*

December 15th. 4,200 ft. of 0.0225 sq. in. high-voltage underground cable. (T. 29197/38.)*

CAPE TOWN.—December 24th. Electricity Supply Commission. 500 30 ft. and 150 27 ft. steel electric lighting poles. (T. 29338/38.)*

St. Helens.—December 12th. Electricity Department. Underground disconnecting boxes and feeder pillars. (November 25th.)

Stockport.—December 24th. Electricity Department. Vertical and horizontal, built-up, skeleton-type sub-station switchgear for twelve months. (See this issue.)

Wakefield.—December 5th. West Riding County Council. Installation of electric lighting in the extensions at Hebden Bridge grammar school. Clerk of the County Council.

December 12th. Electrical installation at Ecclesfield senior school. Education Officer, County Hall.

Wembley.—December 7th. Borough Council. Electric lighting, heating and power installations at the Southern Fire Station, Harrow Road. (November 25th.)

West Hartlepool.—December 14th. Electricity Department. One sheet-steel kiosk sub-station, complete with high- and low-voltage equipment. (See this issue.)

Orders Placed

Buckingham.—County Council. Accepted. Electric lamps for twelve months.—G.E.C.

Croydon.—Electricity Committee. Recommended. Eight 2,000-V switches (£411).—J. G. Statter & Co. Super-heater renewals (£3,646).—Babcock & Wilcox.

Glasgow.—Transport Committee. Accepted. Cables.—Craigpark Electric Cable Co. Asbestos covered wire.—London Electric Wire Co. and Smiths. Transformer for Coplawhill sub-station.—Lindley Thomson Transformer and Service Co. 24-V batteries.—Mansons. Porcelain insulators.—B.I. Cables. Copper wire.—G.E.C.; Whitecross Co.; J. Wilkes, Sons & Mapplebeck. Electric drills.—Buck & Hickman. Trolley-wire.—Richard Johnson, Clapham & Morris. Spares for motors of own make.—English Electric Co.; Met.-Vick. Electrical Co. Circuit-breaker spares.—B.T.H. Co. Tubing and sundries.—Simplex Electric Co.

Recommended. Materials required in connection with the construction of twenty-five bogie cars: Underframes (£2,987).—English Electric Co. Trucks (£14,975).—E.M.B. Co. Switches

(£26).—J. Robertson. Lighting and electrical fittings (£2,615).—Thomas Scott & Co. Electrical equipment (£24,750).—B.T.H. Co.

London.—HAMMERSMITH.—Electricity Committee. Recommended. One electrically driven tower wagon (£651).—Midland Vehicles. Two 500-kVA transformers (£528).—Bonar, Long & Co.

FULHAM.—Electricity and Lighting Committee. Recommended. Five centrifugal type pumps for the sulphur extraction plant (£7,322).—Mather & Platt.

L.C.C.—Wiring and fittings for electric lighting, &c., in a block of dwellings in the Albany Road area, Camberwell:

	£		£
Henfrey (Electrical). Accepted ...	335	Pemberton and Sturgess (Great Britain)	378
Newman and Watson	338	Caine Pernot	396
Samuel Reed & Sons	356	Ernest W. Merredew	400
J. L. Shadwell	359	Keeble	405
Jacob, White & Co.	359	Ilford Electrical Co.	417

Wiring and fittings for the installation of electric lighting, power, &c., in the maternity block at Hackney Hospital:

	£		£
J. L. Shadwell. Accepted ...	2,050	Bower Engineering Works (Electrical and General)	2,396
Troughton and Young	2,119	Leonard G. Tate & Co.	2,442
Read and Partners	2,140	Newman and Watson	2,514
Electrical Installations	2,201	W. J. Furse & Co. (London) ...	2,542
Samuel Reed & Sons	2,250	Atozed (London)	2,637
Pinching and Walton	2,274	A. J. Hewens & Sons	2,797
Berkeley Electrical Engineering Co.	2,365	F. G. Edey & Co.	2,830

Mansfield.—Electricity Committee. Accepted. Underground cables.—Standard Telephones & Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Acton.—Factory, Atlas Road, for T. Wall & Sons, Ltd.

Ayr.—Houses (36), Mainholm Road, for T.C.; Robert Hutchison Builders, Ltd.

Barnsley.—Extensions to premises, for the Wombwell Foundry and Engineering Co., Ltd.

Birkenhead.—Three-storey tenements (36), near Quigley Street; borough engineer.

Bromsgrove.—Houses (994), Callow Brook Farm estate, Rubery; A. & J. Mucklow, builders, 21, High Street, Blackheath, Birmingham.

Broughton (FLINTSHIRE).—Factory, Holyhead-Chester Road, for Vickers-Armstrongs.

Burton-on-Trent.—School, for E.C.; A. H. Blake, director of education.

Caernarvon.—Houses (54), Cefn Hendre; H. Evans, borough surveyor.

Castle Bromwich.—Houses (122), Water Orton Road and Green Lane; H. C. Edwards.

Cheshire.—Extensions to Wrenbury Hall Tuberculosis Colony (£24,284), for the C.C.; county architect, Chester.

Chesterfield.—Houses (85), Gnosborough estate; R.D.C. surveyor.

Cockfosters.—Fire station, Hadley Road; Enfield U.D.C. surveyor.

Congleton.—Houses (94), sixteen sites; W. H. Cross, clerk to R.D.C., Middlewich Road, Sandbach.

Corby Hill.—Houses (24), for Border R.D.C.; housing officer, 5, Victoria Place, Carlisle.

Coventry.—Houses, Beake Avenue, Sadler Road and Burnaby Road; B. Faulconbridge, 154, Cheverall Avenue. Houses (28), Dunchurch Highway, at the corner of Broad Lane; Hobley Bros., 7, Crosbie Road. Houses (26), Lion Fields Avenue; S. H. Hamblin, Wardens Avenue. Houses (170), Pinley Fields estate; A. F. Underhill, housing director, Council House. Houses (20), The Scotchill; Windsor Bros., 177, Stoney Stanton Road.

Dartford.—Houses (303), Princes Road; J. Franklin & Co., Ltd., Erith.

Doncaster.—Houses (45), Harworth; E. Coupe, builder, Harworth.

Eccles.—Houses (84), Guildford Road; S. Crompton. Girls' home, Regent Street; Diocesan Moral Welfare Committee.

Edmonton.—Large dance hall, Cambridge Road; H. R. Ross, architect, 65, Chancery Lane, W.C.2.

Enfield.—Houses (55), Oatlands Road; Swannell & Sly. Two factories, Progress Way; Commercial Structures, Ltd.

Eston.—Houses, Grangetown estate and recreation centre, for the U.D.C. (£50,000); surveyor.

Eton.—Houses (72), Denham estate; R.D.C. surveyor.

Falkirk.—Houses (164), for Corporation; burgh surveyor.

Gateshead.—Library; J. Sutton and Sons, Ltd., contractors, Tinn Street. Mill (£250,000), for J. Rank, Ltd.; Gelder & Kitchen, architects, Alfred Gelder Street, Hull.

Grimsby.—School, Nunsthorpe, for the E.C.; G. H. Turner, architect, 38a, Louth Road, Scartho.

Hull.—School, Clough Road, for the E.C.

Hyde.—School and extensions to school (£33,536), for the E.C.

Jarrow-on-Tyne.—Boot-repairing factory for Jarrow and Hebburn Co-operative Society; Minto and Shearer, builders, Jarrow. School, Clervaux Terrace, for Jarrow Nursery School Committee (£6,000); Tasker and Child, architects, Trinity Buildings, New Bridge Street, Newcastle-on-Tyne. Extensions to Town Hall to provide health department for the T.C.; J. S. Weir, borough engineer.

Kettering.—Alterations and additions to five schools, for the E.C.; J. P. Haugh, borough surveyor.

Leeds.—Offices, South Parade and the Headrow, Leeds, for the Yorkshire Insurance Co., Ltd.; William Airey & Son (Leeds), Ltd., builders, 7, Blenheim Terrace, Leeds, 7.

Leek (STAFFORDSHIRE).—Hospital, Ball Hayes, for the Leek Hospital Committee; Wood & Goldstraw, architects, Victoria Chambers, Station Street, Tunstall, Stoke-on-Trent.

Linwood.—Premises, Bridge Street, for J. Y. Keanie, Ltd.

Littleborough.—Houses, Shore site and Smithy Bridge, for the Housing Committee.

Loanhead.—Houses (62), with electrical work, for T.C.; G. B. Deas, architect, Central Chambers, High Street, Kirkcaldy.

London.—(CATFORD).—Houses (45), Whitefoot Lane, Hall Park estate; Wates, Ltd., London Road, Norbury. (HAMMERSMITH).—Buildings, Beavor Lane and Theresa Street; H. C. Constantine, 9, Bentinck Street, W.1. Flats (100), Becklow Place; Kirk & Kirk, Ltd., 287, Upper Richmond Road, S.W.15. (STEPNEY).—Dwellings (162), Shadwell Gardens estate; L.C.C. architect, County Hall, Westminster Bridge Road, S.E.1. (STOKE NEWINGTON).—Community centre, Lordship Terrace estate, and clinic (£17,000); Howes & Jackman, architects, 10, Gray's Inn Square, W.C.1.

Loughborough.—Houses (50), Ling Farm estate, for the T.C.; William Davis & Co. (Leicester), Ltd., contractors, 33, Cattle Market.

Manchester.—Flats (248), Miles Platting, for the Housing Committee; J. Hughes, housing director. Large extensions to works, Lyons Road, Trafford Park, for Ingersoll Rand Co., Ltd., Trafford Park; A. Clayton, architect, Duchy Chambers, 2, Clarence Street.

Mangotsfield.—Extensions to hospital for Mangotsfield & Warmley Joint Hospital Board (£12,000).

Mansfield.—Houses (12), Bull Farm estate; T. Smith & Sons, Ltd.

Middlesbrough.—Houses (112), Cargo Fleet Lane; Regent Dwellings, Ltd. Houses (13), Northern Road; J. Gilmore, builder, 179, West Lane. Central premises for the Co-operative Society; C.W.S. Building Department, West Blandford Street, Newcastle-on-Tyne. Additions to nurses' home, Marton Road; Kitching and Co., architects, 21, Albert Road. Additions to the Priory Social Club, Bridge Street; Archibald and Archibald, architects, 26, Albert Road.

Newcastle-on-Tyne.—Extensions to premises, Scrogg Road and Western Avenue, for the City Council, in connection with A.R.P.; city architect.

New Earswick.—School (£26,733), for Joseph Rowntree Village Trust; F. W. Plaxton, builder, Marlborough Street, Scarborough.

Newport (MONMOUTHSHIRE).—Civic centre, third section (main municipal block); O. Treharne Morgan, town clerk.

Northallerton.—Cinema; E. Thompson, builder, 12, Grey Street, Newcastle-on-Tyne.

Oldham.—Houses (224), Stoneleigh housing scheme No. 2; G. Lees, deputy borough surveyor, 75, Union Street.

Paisley.—Improvement scheme at Corporation Baths (heating system, Russian bath, &c.); burgh surveyor.

Petersfield.—Gymnasium, Churcher's College (£4,000); governors.

Prestonpans (EAST LOTHIAN).—Oilskin factory; Daniel Buchanan and Sons, Prestonpans.

Redcar (YORKSHIRE).—Council offices; J. Locking, surveyor.

Sale.—Cinema, Northenden Road; Roberts, Wood & Elder, architects, 26, King Street, Manchester.

Sheffield.—Flats (68) and garages, Clarkehouse Road and Antrim Avenue; H. Glass, 36, Bank Street, Sheffield, 1.

Shropshire.—Adaptation of Mansion House (£34,196), for the Mental Deficiency Committee; A. G. Chant, county architect, 5, Belmont, Shrewsbury.

Southgate.—Shops and flats, Green Lanes; Chessums, Ltd., Imperial Works, Portland Road, N.15.

South Shields.—Houses (500), Marsden, and blocks of houses; borough engineer.

Stirling.—Houses (150), Raploch Road, Linden Avenue, and Bannockburn Road, for T.C.; D. B. Morris, town clerk.

Stockport.—Factory, Wilmslow Road, Woodford; A. V. Rowe & Co., Ltd., Newton Heath, Manchester.

Stockton-on-Tees.—Houses, Beaconsfield Road and Hillside Road; Kendrews, Ltd., builders, Norton House estate. Additions to nurses' home at the Stockton and Thornaby Hospital; William Cowan and Son, builders, 1, Skinner Street.

Sunderland.—Reconstruction of works for Steel & Co.; Joseph Huntley & Son, contractors, Marion Street.

Tenby.—Houses (29), for the Council; B. Morley, Council Offices, South Parade.

Waddon.—Factory, Purley Way; Croydon Factory Estate, Ltd.

Walkington.—Extensions, with electrical work, at Nurses' Home, Mental Hospital, for East Riding Mental Hospitals Visiting Committee; county architect, County Hall, Beverley.

Warminster.—Houses (80); U.D.C. surveyor.

Warwickshire.—Extensions to Shire Hall, Warwick (over £60,000); county architect, Warwick.

West Hartlepool.—Hotel, Raby Road, for H. K. Dyer; John Proud, Ltd., contractors, 195, York Road.

Wimborne.—School, Ferndown, for Wimborne R.D.C.

Worthing.—Houses (24), Bury Drive; West Sussex Development Co., Ltd. School, West Tarring (£33,645); borough surveyor.

X-ray Apparatus for Westminster Hospital

AN immediate expenditure of £10,000 upon X-ray and other electrical equipment for the new Westminster Hospital, which is expected to be completed by next spring, has been approved by the governors, states *The Times*. This will include a "Tomograph," which takes radiographs of selected layers of the human subject, and X-ray therapy apparatus of much higher output than has hitherto been possible. Plenty of space has been allotted for treatment by diathermy, radiant heat, artificial sunlight, and other electrical methods.

Telephone Wires

THE British Standards Nos. 174-181 for overhead line-wire material (non-ferrous) and Nos. 182-184 for galvanised iron and steel wire, both for telegraph and telephone purposes, which have recently been under revision, have now been published. Additional sizes have been added in both and the scope of B.S. 183 has been extended to cover suspension strand, and includes material of 31, 45 and 70 tons per sq. in. breaking strength. Copies of the two series (Nos. 174/181 and 182/184) may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. each, post free.